M67001.AR.005873
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TECHNICAL MEMORANDUM SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OPERABLE UNIT 1 (OU 1) SITE 78 MCB CAMP LEJEUNE NC

3/25/2014

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Supplemental Groundwater Investigation Operable Unit 1, Site 78 Marine Corps Installations East-Marine Corps Base Camp Lejeune North Carolina

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DATE: March 25, 2014

This Technical Memorandum presents a summary of the supplemental groundwater investigations conducted during 2011 and 2012 at Operable Unit (OU) 1, Site 78, Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ), North Carolina (**Figure 1**). Based on the expansive groundwater plume and recent long-term monitoring (LTM) data, this supplemental investigation was conducted to evaluate if the LTM program and land use controls (LUCs) remain protective in the short-term and support the future evaluation of alternative treatment technologies for long-term protectiveness. This Technical Memorandum provides background information, outlines the supplemental groundwater investigation activities and results, updates the conceptual site model, and provides conclusions and recommendations for LUCs and the LTM program.

1 Background

Site 78, located within the 'Mainside' of MCIEAST-MCB CAMLEJ, is bordered by Holcomb Boulevard to the north, Sneads Ferry Road to the east, Louis Road and Duncan Street to the south, and McHugh Boulevard to the west (**Figure 2**). The site covers approximately 590 acres in the Hadnot Point Industrial Area (HPIA).

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Program, investigations at Site 78 have been conducted since 1983 and the site is currently designated remedy-in-place. An Interim Record of Decision (ROD) (Baker, 1992), Final ROD (Baker, 1994), and Explanation of Significant Difference (ESD) (Baker, 1995) were signed for OU 1. The primary constituents of concern (COCs) at Site 78 were volatile organic compounds (VOCs) and metals in groundwater and pesticides and polychlorinated biphenyls (PCBs) in soil. The selected remedy from the ROD was excavation and offsite disposal of pesticide and PCB-contaminated soil to achieve industrial cleanup levels, groundwater extraction and treatment system, LTM, and LUCs. Soil excavation was completed in 1995 (OHM, 1996), the groundwater treatment system is currently operating, and groundwater LTM is ongoing. A Land Use Control Implementation Plan (LUCIP) restricting aquifer use, groundwater intrusive activities, and non-industrial use was completed in 2001. LUCs were implemented in 2001 and amended in 2002.

Site 78 consists of groundwater VOC plumes in two distinct areas: the northern area in the vicinity of Buildings 901, 902, and 903 (Site 78 North) and the southern area in the vicinity of Buildings 1601 and 1603 (Site 78 South). In between Site 78 North and Site 78 South, there is a petroleum-related groundwater plume associated with the Hadnot Point Fuel Farm (HPFF) that is being addressed separately by the underground storage tank (UST) program. Groundwater within Site 78 North and South is primarily impacted with chlorinated volatile organic compounds (CVOCs) and petroleum-related hydrocarbons. The VOC COCs at Site 78 include VOCs identified in the ROD, other VOCs that have exceeded North Carolina Groundwater Quality Standards (NCGWQS) in the previous four quarters of LTM, and any associated daughter products. The petroleum-related COCs for Site 78 currently include benzene, toluene, ethylbenzene, and total xylenes (BTEX), isopropylbenzene, and 1,2-dichloroethane (DCA). The CVOC COCs currently include tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), vinyl chloride (VC), trans 1,2-DCE, 1,1-DCA, 1,1-DCE, 1,2-dibromo-3-chloropropane, and methylene chloride.

During late 2010 and early 2011, Rhea Engineers & Consultants, Inc. (Rhea) collected preliminary screening data using direct push technology (DPT) groundwater sampling techniques to delineate VOC plumes, as reported in the *Technical Memorandum, Contaminant Plume Delineation, Operable Unit No. 1, Installation Restoration Site 78* (Rhea, 2011) (**Figure 3**). The analytical data collected during this investigation indicated that the well network present at the site was insufficient in defining both lateral and vertical extents of the groundwater plumes.

As a result of Rhea's findings, the Partnering Team recommended further investigation and confirmation of the original results. These follow-on investigations were conducted in a phased approach and included:

- Confirmatory groundwater investigation – July through September 2011
- Passive soil gas survey – December 2011
- Additional groundwater investigation – March through April 2012
- Membrane interface probe (MIP) investigation – June 2012
- Vapor intrusion screening – based on 2011 and 2012 groundwater analytical results

2 Field Investigations

2.1 Confirmatory Groundwater Investigation (July – September 2011)

The confirmatory groundwater investigation was conducted to confirm the results of the Rhea DPT investigation and refine the extent of the groundwater VOC plumes. The field activities, including monitoring well installation and VOC groundwater sampling, were conducted between July and September 2011 in accordance with the SAP (CH2M HILL, 2011).

Miller Drilling Company, a North Carolina-licensed well driller, used rotosonic drilling techniques to install 26 monitoring wells, including 18 in Site 78 North and eight in Site 78 South (**Figure 3**). The wells were installed within the surficial (up to 30 feet (ft) below ground surface [bgs]), upper Castle Hayne (30 to 60 ft bgs), middle Castle Hayne (60 to 110 ft bgs), and lower Castle Hayne (110 to 150 ft bgs) aquifers, as summarized in **Table 1**.

TABLE 1
Monitoring Well Construction Details

Well Identification (ID)	Installation Date	Total Depth (ft bgs)	Screened Interval (ft bgs)	Aquifer
Site 78 North				
IR78-GW87MCH	7/28/2011	80	70-80	Middle Castle Hayne
IR78-GW88UCH	8/02/2011	40	30-40	Upper Castle Hayne
IR78-GW89MCH	9/1/2011	70	60-70	Middle Castle Hayne
IR78-GW90MCH	8/31/2011	110	100-110	Middle Castle Hayne
IR78-GW91LCH	8/24/2011	150	140-150	Lower Castle Hayne
IR78-GW92MCH	8/14/2011	70	60-70	Middle Castle Hayne
IR78-GW93MCH	8/13/2011	110	100-110	Middle Castle Hayne
IR78-GW94LCH	8/12/2011	150	140-150	Lower Castle Hayne
IR78-GW95MCH	8/22/2011	70	60-70	Middle Castle Hayne
IR78-GW96MCH	8/16/2011	110	100-110	Middle Castle Hayne
IR78-GW97LCH	8/15/2011	150	140-150	Lower Castle Hayne
IR78-GW98MCH	7/26/2011	90	80-90	Middle Castle Hayne
IR78-GW99MCH	7/26/2011	80	70-80	Middle Castle Hayne
IR78-GW100MCH	7/30/2011	70	60-70	Middle Castle Hayne

TABLE 1
Monitoring Well Construction Details

Well Identification (ID)	Installation Date	Total Depth (ft bgs)	Screened Interval (ft bgs)	Aquifer
IR78-GW101MCH	7/28/2011	70	60-70	Middle Castle Hayne
IR78-GW102MCH	8/2/2011	70	60-70	Middle Castle Hayne
IR78-GW103MCH	8/1/2011	110	100-110	Middle Castle Hayne
IR78-GW104LCH	7/31/2011	150	140-150	Lower Castle Hayne
Site 78 South				
IR78-GW105MCH	9/2/2011	80	70-80	Middle Castle Hayne
IR78-GW106MCH	8/24/2011	109	99-109	Middle Castle Hayne
IR78-GW107	8/13/2011	30	20-30	Surficial
IR78-GW108UCH	8/11/2011	60	50-60	Upper Castle Hayne
IR78-GW109UCH	7/29/2011	60	50-60	Upper Castle Hayne
IR78-GW110MCH	8/10/2011	90	80-90	Middle Castle Hayne
IR78-GW111MCH	8/1/2011	90	80-90	Middle Castle Hayne
IR78-GW112MCH	8/9/2011	90	80-90	Middle Castle Hayne

Following installation of the monitoring wells, groundwater samples were collected from 119 wells, including the 26 newly installed wells, 82 existing wells, and 11 recovery wells across Site 78 North and Site 78 South, as summarized in **Table 2**.

All samples were shipped under chain-of-custody control via overnight delivery to Environmental Conservation Laboratories, Inc., in Orlando, Florida. All groundwater samples were analyzed for VOCs.

2.1.1 Results

During the confirmatory groundwater investigation, a total of 15 VOCs were detected in the groundwater samples at concentrations exceeding their respective cleanup level and/or the more stringent of the North Carolina Groundwater Quality Standards (NCGWQS) and Safe Drinking Water Act Maximum Contaminant Levels (MCLs). Laboratory analytical data from this phase of investigation are presented in **Tables 3** and **4**. **Figure 3** presents the progression of the understanding of the VOC plumes exceeding NCGWQS/MCLs through the supplemental investigation.

Site 78 North

Tables 5 and **6** present a summary of the BTEX constituents and CVOCs that exceeded NCGWQS/MCLs, respectively. Analytical data confirmed the results of the investigation conducted by Rhea, which indicated contamination was present in groundwater outside of the previous LTM well network (**Figure 3**). The data indicate that BTEX and CVOCs have migrated horizontally and vertically beyond the boundaries of contamination as defined by previous investigations. BTEX and CVOCs were detected northwest of Car Wash Road and were inferred to extend northwest of Holcomb Boulevard. CVOC concentrations increase with depth and the highest concentrations were detected in samples collected from the newly installed monitoring wells screened within the middle Castle Hayne aquifer. Specifically, the highest concentrations were detected in the sample collected from IR78-GW90MCH (100 to 110 ft bgs). Soil boring logs (**Attachment A**) at the locations of monitoring wells IR78-GW90MCH and IR78-GW91LCH indicate gradational changes in lithology between 90 and 106 ft bgs. Poorly

sorted, gravelly sand was observed between 93 to 101 ft bgs, with photo-ionization detector (PID) screening measurements of 61 parts per million (ppm) of VOCs. Beneath the sand layer, fine-grained sandy clay and silty sand were observed from 101 to 105 ft bgs with lower PID readings of 4.4 ppm of VOCs, suggesting that vertical migration of VOCs is retarded by the sandy clay layer. Within the lower Castle Hayne aquifer, VOC concentrations in groundwater are orders of magnitude lower than the VOCs detected in samples collected from the middle Castle Hayne aquifer. Only one CVOC was detected above the NCGWQS/MCL; VC was detected in the groundwater sample collected from monitoring well IR78-GW30-3 (screened from 140 to 150 ft bgs) at a concentration of 3 µg/L. Due to the discovery of VOCs beyond the boundaries of contamination defined by previous investigations, additional investigation was needed to assess the horizontal distribution of groundwater contamination within the surficial, upper Castle Hayne, and middle Castle Hayne aquifers; to assess the vertical distribution of VOCs in the middle Castle Hayne aquifer; and to evaluate the site for additional sources that may be associated with detections of VOCs in previously unknown areas of contamination.

TABLE 5
BTEX Exceedances, Site 78 North (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration micrograms per liter (µg/L)	Location of Maximum Concentration
Benzene	Surficial	4	4	53	IR78-GW22-1
	Upper Castle Hayne	12	11	180	IR78-GW80IW
	Middle Castle Hayne (70-90 ft)	5	4	130	IR78-GW92MCH
	Middle Castle Hayne (90-110 ft)	1	1	5.3 J	IR78-GW90MCH
	Lower Castle Hayne	2	1	1.7	IR78-GW30-3
Toluene	Surficial	2	0	17	IR78-GW22-1
	Upper Castle Hayne	1	0	5.5	IR78-GW43
	Middle Castle Hayne (70-90 ft)	3	0	16	IR78-GW100MCH
	Lower Castle Hayne	1	0	1.1	IR78-GW30-3
Ethylbenzene	Surficial	2	0	1.2	IR78-GW22-1
	Upper Castle Hayne	1	0	1.6	IR78-GW43
	Middle Castle Hayne (70-90 ft)	2	0	10	IR78-GW100MCH
Xylenes, total	Surficial	2	0	17	IR78-GW22-1
	Upper Castle Hayne	1	0	11	IR78-GW43
	Middle Castle Hayne (70-90 ft)	2	0	12	IR78-GW30-2; IR78-GW100MCH

TABLE 6
CVOC Exceedances, Site 78 North (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
PCE	Middle Castle Hayne (70-90 ft)	2	2	6.3	IR78-GW89MCH
	Middle Castle Hayne (90-110 ft)	2	1	140 J	IR78-GW90MCH
TCE	Surficial	2	1	3.3	IR78-GW24-1
	Upper Castle Hayne	8	2	15	IR78-GW71
	Middle Castle Hayne (70-90 ft)	2	2	150	IR78-GW89MCH
	Middle Castle Hayne (90-110 ft)	1	1	9,500	IR78-GW90MCH
	Lower Castle Hayne	1	0	0.64 J	IR78-GW94LCH

TABLE 6
CVOC Exceedances, Site 78 North (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
Cis-1,2-DCE	Surficial	4	2	110	IR78-GW24-1
	Upper Castle Hayne	12	5	420	IR78-GW71
	Middle Castle Hayne (70-90 ft)	6	1	200	IR78-GW89MCH
	Middle Castle Hayne (90-110 ft)	3	2	6,700	IR78-GW90MCH
VC	Surficial	3	3	25	IR78-MWVI01
	Upper Castle Hayne	7	7	250	IR78-GW71
	Middle Castle Hayne (70-90 ft)	4	4	95	IR78-GW100MCH
	Middle Castle Hayne (90-110 ft)	2	2	110 J	IR78-GW90MCH
	Lower Castle Hayne	1	1	3	IR78-GW30-3

Site 78 South

Tables 7 and **8** present a summary of the BTEX constituents and CVOCs that exceeded NCGWQS/MCLs, respectively. Analytical data confirmed the results of the investigation conducted by Rhea (**Figure 3**). Review of the analytical data indicates that the distribution of BTEX constituents and CVOCs within the surficial aquifer has been defined. However, newly discovered areas of contamination within the upper and middle Castle Hayne aquifers were not defined. The highest concentrations of BTEX and CVOC constituents were detected in samples collected from the upper Castle Hayne aquifer beyond the boundaries of contamination defined by previous investigations. In particular, the highest TCE concentration at Site 78 was detected in the sample collected from the newly installed monitoring well IR78-GW109UCH (screened from 50 to 60 ft bgs). Additional investigation was needed to further assess the horizontal and vertical distribution of contamination within the upper Castle Hayne aquifer; to assess the vertical distribution of VOCs within the middle and lower Castle Hayne aquifers in the vicinity of IR78-GW109UCH; and to evaluate the site for additional sources that may be associated with detections of VOCs in previously unknown areas of contamination.

TABLE 7
BTEX, Site 78 South (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
Benzene	Surficial	3	2	220	IR78-GW53R
	Upper Castle Hayne (30-50 ft)	7	7	1,100	IR78-GW75-1
	Upper Castle Hayne (50-60 ft)	1	0	0.64 J	IR78-GW109UCH
Toluene	Surficial	4	0	210	IR78-GW60
	Upper Castle Hayne (30-50 ft)	7	4	15,000	IR78-GW75-1
	Middle Castle Hayne	1	0	0.68 J	IR78-GW86DW
Ethylbenzene	Surficial	3	1	1,900	IR78-GW60
	Upper Castle Hayne (30-50 ft)	7	3	1,500	IR78-GW77
Xylenes, total	Surficial	3	2	8,200	IR78-GW60
	Upper Castle Hayne (30-50 ft)	7	4	5,500	IR78-GW77

TABLE 8
CVOC Exceedances, Site 78 South (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
PCE	Surficial	2	2	10	IR78-GW73
	Upper Castle Hayne (30-50 ft)	2	2	2.9	IR78-GW75-1
TCE	Surficial	8	5	420	IR78-GW60; IR78-GW76
	Upper Castle Hayne (30-50 ft)	7	5	200	IR78-GW77
	Upper Castle Hayne (50-60 ft)	1	1	12,000	IR78-GW109UCH
	Middle Castle Hayne	1	1	28	IR78-GW105MCH
Cis-1,2-DCE	Surficial	14	2	500	IR78-GW42
	Upper Castle Hayne (30-50 ft)	9	5	160	IR78-GW74; IR78-GW75-2
	Upper Castle Hayne (50-60 ft)	1	1	360	IR78-GW109UCH
	Middle Castle Hayne	2	0	14	IR78-GW105MCH
VC	Surficial	7	7	140	IR78-GW42
	Upper Castle Hayne (30-50 ft)	5	5	180	IR78-GW52R
	Upper Castle Hayne (50-60 ft)	1	1	2.5	IR78-GW109UCH

2.2 Passive Soil Gas Survey (December 2011)

Based on the results of the confirmatory groundwater investigation, a passive soil gas survey was conducted in an effort to identify potential source areas for the VOCs detected Site 78 North beyond the boundaries of contamination defined by previous investigations (**Figure 3**). The passive soil gas survey was conducted where groundwater results exhibited elevated concentrations of CVOCs to the west and northwest of Building 902 at monitoring wells IR78-GW89MCH, IR78-GW90MCH, IR78-GW92MCH, IR78-GW93MCH, and IR78-IR78-GW96MCH. The highest concentration of TCE was detected in the sample collected from IR78-MW90MCH (9,500 µg/L), suggesting that there may be additional sources between the previously identified source area at Building 902 and Holcomb Boulevard.

In December 2011, 31 passive soil gas modules were deployed on a 150-foot grid pattern within Site 78 North, as shown on **Figure 4**. Prior to installation of each module, a PID was used to screen the sample location for VOCs. Each passive soil gas module, fitted with a sampling cap, was then inserted 4 inches inside a metal pipe that had been placed to a depth of 12 inches bgs. The open end of the pipe was plugged and covered with soil.

Following a 17-day residence period, all modules were removed from the subsurface in the same order as they were installed. The sealed and labeled modules were placed in individual plastic bags and shipped under chain of custody to Beacon Environmental Services, Inc., for laboratory analysis of target compound list (TCL) VOCs by a modified USEPA Method 8260C.

2.2.1 Results

The analytical data from the passive soil gas survey are summarized in **Table 9** and detections are shown on **Figure 4**. Five VOCs, including toluene, PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE, were detected in the passive soil

gas samples. Toluene was detected at relatively low concentrations in nine of the 31 samples, ranging from 36 nanograms (ng) (IR78-SG111 and IR78-SG113) to 365 ng (IR78-SG100). CVOCs were only detected in passive soil gas samples collected from two locations: IR78-SG116, with a total of 4,424 ng of CVOCs, and IR78-SG124, with a total of 26 ng of CVOCs. Analytical results were two orders of magnitude higher in the soil gas sample collected from IR78-SG116 than in the sample from IR78-SG124, suggesting surficial contamination potentially representative of an independent source area.

2.3 Additional Groundwater Investigation (March – April 2012)

Based on the results of the confirmatory groundwater investigation and passive soil gas survey, an additional investigation, including monitoring well installation and groundwater sample collection, was conducted to further assess VOC distribution at Site 78 North and South. In 2012, Drill Pro, LLC, a North Carolina-licensed well driller, installed 10 monitoring wells via rotosonic drilling techniques as presented in **Table 10** below and illustrated on **Figure 3**.

At Site 78 North, three monitoring wells were installed in the surficial aquifer; one monitoring well was installed in the upper Castle Hayne aquifer; and two monitoring wells were installed in the middle Castle Hayne aquifer. At Site 78 South, two monitoring wells were installed in the upper Castle Hayne aquifer; one monitoring well was installed in the middle Castle Hayne aquifer; and one monitoring well was installed in the lower Castle Hayne aquifer **(Figure 3**). Well construction details and rationale for well installation locations are summarized in **Table 10**.

TABLE 10
Monitoring Well Construction Details

Well ID	Installation Date	Total Depth (ft bgs)	Screened Interval (ft bgs)	Aquifer	Installation Rationale
Site 78 North					
IR78-GW113	3/31/12	20	10-20	Surficial	Assessment of potential source area between Building 902 and Holcomb Boulevard
IR78-GW114	4/1/12	20	10-20	Surficial	Assessment of potential source area based on elevated detections of VOCs in passive soil gas sample collected at this location
IR78-GW115	3/31/12	20	10-20	Surficial	Refine upgradient extent of CVOCs to delineate the plume
IR78-GW116MCH	3/28/12	110	105-110	Middle Castle Hayne	Assess vertical distribution of VOCs in relation to the fine-grained silt and sandy clay observed in the vicinity of IR78-GW90MCH
IR78-GW117UCH	4/1/12	60	50-60	Upper Castle Hayne	Evaluate potential VOC mass migration along anticipated groundwater flow path
IR78-GW126MCH	4/4/12	90	80-90	Middle Castle Hayne	Assess vertical distribution of VOCs in relation to the fine-grained silt and sandy clay observed in the vicinity of IR78-GW90MCH
Site 78 South					
IR78-GW121UCH	3/30/12	60	50-60	Upper Castle Hayne	Assess vertical distribution of VOCs in relation to the clay layer observed in the vicinity of IR78-GW109UCH
IR78-GW123UCH	4/13/12	60	50-60	Upper Castle Hayne	Assess vertical distribution of VOCs in relation to the clay layer observed the vicinity of IR78-GW109UCH
IR78-GW128MCH	4/19/12	105	100-105	Middle Castle Hayne	Refine the vertical delineation of VOCs in the vicinity of IR78-GW109UCH
IR78-GW129LCH	11/10/12	150	145-150	Lower Castle Hayne	Define the vertical extent of VOCs in the vicinity of IR78-GW109UCH

Following installation of the monitoring wells, groundwater samples were collected from 11 wells, including the 10 newly installed wells and one existing well, as summarized in **Table 2.** Groundwater samples were collected in accordance with the SAP (CH2M HILL, 2011). During the installation of IR78-GW113 at Site 78 North, a monitoring well with no well tag was observed near the drilling location. This well is suspected to be associated with an investigation conducted at Building 902. The total well depth was gauged and measured to be 77 ft bgs. A groundwater sample was collected from the well, identified as IR78-GWXXMCH. This monitoring well has since been abandoned due to military construction (MILCON).

All samples were shipped under chain-of-custody control via overnight delivery to Environmental Conservation Laboratories, Inc., in Orlando, Florida. All groundwater samples were analyzed for VOCs.

Due to the presence of clay within the screened intervals, monitoring wells IR78-GW90MCH at Site 78 North and IR78-GW109UCH at Site 78 South were abandoned in March and April 2012 in accordance with North Carolina well drilling standards to avoid the potential for preferential pathways between portions of the aquifers not previously in direct communication (**Figures 5** and **6**).

2.3.1 Results

Analytical data for Site 78 North and Site 78 South are presented in **Tables 3** and **4**, respectively. VOC plumes exceeding the NCGWQS/MCLs are shown on **Figure 3**.

Site 78 North

Tables 11 and **12** present a summary of the BTEX constituents and CVOCs that exceeded NCGWQS/MCLs, respectively. BTEX constituents were only detected above method detection limits in groundwater samples collected from the middle Castle Hayne aquifer. CVOCs, however, were detected at concentrations exceeding NCGWQS/MCLs in samples collected from the surficial, upper Castle Hayne, and middle Castle Hayne aquifers. The highest concentrations of CVOCs were detected in samples collected from the middle Castle Hayne aquifer, in the vicinity of the newly identified VOC plume near IR78-GW90MCH (**Figure 3**).

TABLE 11
BTEX Exceedances, Site 78 North (April, 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
Benzene	Middle Castle Hayne (70-90 ft)	2	1	2.4	IR78-GWXXMCH
Toluene	Middle Castle Hayne (70-90 ft)	1	0	2.3	IR78-GWXXMCH

TABLE 12
CVOC Exceedances, Site 78 North (April, 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
PCE	Surficial	1	1	14	IR78-GW114
	Middle Castle Hayne (70-90 ft)	1	1	89	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	47	IR78-GW116MCH
TCE	Surficial	2	1	9.5	IR78-GW114
	Upper Castle Hayne	1	1	23	IR78-GW117UCH
	Middle Castle Hayne (70-90 ft)	1	1	1,100	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	2,700	IR78-GW116MCH

TABLE 12
CVOC Exceedances, Site 78 North (April, 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
Cis-1,2-DCE	Surficial	2	0	20	IR78-GW113
	Upper Castle Hayne	1	0	9	IR78-GW117UCH
	Middle Castle Hayne (70-90 ft)	1	1	320	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	710	IR78-GW116MCH
VC	Upper Castle Hayne	1	1	1.7J	IR78-GW117UCH
	Middle Castle Hayne (70-90 ft)	2	2	14	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	25	IR78-GW116MCH

Compound-specific Isotope Analysis

As part of the additional groundwater investigation, isotopic fingerprinting was conducted by performing compound-specific isotope analysis (CSIA) for carbon and chlorine to assess whether the TCE detected in the groundwater sample collected from IR78-GW116MCH is related to the suspected source area at Building 902, or if separate sources are responsible for these detections. The analysis examined the isotopic ratios of ^{13}C ($\delta^{13}C$) and ^{37}Cl ($\delta^{37}Cl$) of TCE and its daughter products in groundwater samples collected from monitoring wells located along the flow path from Building 902 to IR78-GW116MCH (IR78-GW72, IR78-GW114, IR78-GW116MCH, and IR78-GW117UCH).

The CSIA data are summarized in **Table 13**. The CSIA data and analytical results for TCE in groundwater collected from IR78-GW72 in the vicinity of Building 902 indicate that TCE has degraded and transformed completely, with -6.77 per mil $\delta^{13}C$ and 8.2 per mil $\delta^{37}Cl$. Analytical results for groundwater samples collected from downgradient monitoring wells IR78-GW113 and IR78-GW100MCH also indicate TCE degradation. Conversely, the CSIA data collected from IR78-GW116MCH and IR78-GW117UCH indicate $\delta^{13}C$ of -21.11 per mil and -21.93 per mil, respectively, and $\delta^{37}Cl$ of 4.3 per mil. These results indicate a significantly different pattern of the CSIA, suggesting that the TCE detected in the samples collected from IR78-GW116MCH and IR78-GW117UCH is not likely linked to the known source at Building 902.

Site 78 South

Tables 14 and **15** present a summary of the detections of BTEX constituents and CVOCs, respectively. BTEX constituents were not detected above NCGWQS/MCLs in the samples collected during the additional groundwater investigations. CVOCs were detected at concentrations exceeding the NCGWQS/MCL in samples collected from the 50- to 60-foot zone of the upper Castle Hayne aquifer and one sample collected from the middle Castle Hayne aquifer. Within the 50- to 60-foot zone of the upper Castle Hayne aquifer, the concentrations of CVOCs detected in IR78-GW121UCH were similar to those detected in IR78-GW109UCH, as presented in **Table 4**. In the soil boring at the location of IR78-GW121UCH, the clay layer was not encountered (**Figure 6**). These findings indicate that the clay layer is discontinuous and does not retard vertical migration of VOCs. VOCs were not detected above method detection limits in the sample collected from the lower Castle Hayne aquifer.

TABLE 14
BTEX Exceedances, Site 78 South (April 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
Toluene	Upper Castle Hayne (50-60 ft)	1	0	1.3 J	IR78-GW124UCH
	Middle Castle Hayne	1	0	2.3	IR78-GW128MCH

TABLE 15
CVOC Exceedances, Site 78 South (April 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
TCE	Upper Castle Hayne (50-60 ft)	2	2	11,000	IR78-GW121UCH
	Middle Castle Hayne	1	1	11	IR78-GW128MCH
Cis-1,2-DCE	Upper Castle Hayne (50-60 ft)	2	2	430	IR78-GW121UCH

2.4 Membrane Interface Probe Investigation (June 2012)

Analysis of groundwater results identified a previously unknown area of impacted groundwater in the vicinity of monitoring well IR78-GW109UCH. In June 2012, a MIP investigation was conducted in this area to further characterize the distribution of VOCs and to evaluate potential source areas. MIP was selected because it allows for real-time continuous qualitative measurements of relative VOC concentrations using a PID, flame ionization detector (FID), and electron capture detector (ECD). Soil properties (including indirect pore pressure and electrical conductivity) are also measured to assess subsurface lithological conditions. MIP results and data logs are included in **Attachment B**.

As shown on **Figure 7**, a total of 14 MIP borings were advanced using a DPT drill rig. Total depths ranged from 27.5 ft bgs (MIP-08) to 58.5 feet bgs (MIP-06), as determined by drilling refusal. Based on the boring logs for wells in the vicinity of the MIP investigation (IR78-GW109UCH, IR78-GW121UCH, and IR78-GW123UCH, see **Attachment A**), rod refusal appears to correlate with intervals where fine grained silty sand with partially cemented sand fragments were encountered. The first MIP boring (MIP-01) was located next to IR78-GW121UCH and the data collected were used to calibrate the MIP response against known VOC concentrations (**Figure 6**). Subsequent borings radiated outwards to capture a gross horizontal extent, then returned inward to refine the extent of impacted soil and groundwater. ECD responses above background levels in MIP-01 were measured between 50 and 58 feet bgs, with a maximum measurement of 1.1×10^6 microvolts (µV) measured between 52 ft bgs and refusal (58 ft bgs), correlating with high VOC concentrations detected in groundwater samples collected from IR78-GW109UCH. The lower extent of contamination was not delineated in this area using MIP, as a decreased ECD response was not measured in the boring prior to rod refusal. Because refusal depth appears to correlate with intervals where fine grained silty sand with partially cemented sand fragments were encountered, VOCs may be vertically controlled by lithologic units within this limited area.

ECD responses of 10^6 µV were measured in three other MIP borings (MIP-09, MIP-11, and MIP-13). Of these, the shallowest ECD responses were observed in MIP-11, between 36 and 58 ft bgs, with responses of 10^6 µV observed between 43 and 50 ft bgs and between 56 to 58 ft bgs. As with MIP-01, the ECD response did not decrease prior to drilling refusal at this location and the lower extent of contamination was not encountered, again suggesting vertical control of VOCs by lithologic units. At MIP-9, elevated ECD responses were observed from approximately 44 to 52 ft bgs, and then decreased to background levels at 53 ft bgs. ECD responses of 10^6 µV were measured in

MIP-13 between 46 and 50 ft bgs and similarly decreased to background levels at 53 ft bgs. A slightly lesser ECD response of 10^5 μV was measured at approximately 50 ft bgs in MIP borings MIP-14 and MIP-12, suggesting the presence of VOCs at decreasing concentrations in these areas. ECD responses decreased to background levels in each of these locations prior to refusal. At eight of the MIP boring locations, elevated ECD responses were not measured.

The area of highest ECD responses correspond with high VOC concentrations measured in groundwater samples collected from nearby monitoring wells that are screened within similar intervals. The highest responses were measured in MIP locations near the intersection of Gum Street and Hammond Road (**Figure 7**). The shallowest ECD responses were measured in MIP-11, suggesting a potential source area near, or slightly northeast, of that location.

2.5 Vapor Intrusion Screening

Site 78 was included as part of the phased Basewide vapor intrusion (VI) evaluation to determine if complete or significant exposure pathways exist for VI into buildings located within 100 ft of the shallow groundwater plumes (CH2M HILL, 2009 and CH2M HILL, 2011). Overall, the evaluation concluded that VI is not a current significant pathway of concern for the buildings associated with CERCLA Site 78. However, a potential for the VI pathway to become significant at Building 902 was identified. As a result, a vapor intrusion mitigation system (VIMS) was installed at Building 902 as a proactive measure. The VIMS began operation in early 2012. The Basewide VI evaluation recommended additional subslab soil gas and indoor air sampling at Buildings 1601 and 1606 (**Figure 2**), due to detections of VOCs in subslab soil gas above the Base-specific soil gas screening levels. The additional investigation was conducted in 2013 and the results are pending.

The VOC plumes in the surficial aquifer in both Site 78 North and Site 78 South are located within 100 ft of buildings in the HPIA. Therefore, groundwater analytical data collected as part of this supplemental investigation were compared to groundwater screening levels (GWSLs) to re-evaluate the potential for VI (**Tables 16** and **17**).

At Site 78 North, groundwater samples collected from the surficial aquifer monitoring wells between September 2011 and May 2012 contained concentrations of VOCs above GWSLs (**Table 16**). These samples were collected from wells located closest to Buildings 902 and 903. Building 902 has a VIMS installed and is included in the VIMS monitoring program. Building 903 was evaluated as part of the Basewide VI evaluation and no further action was recommended based on the results of groundwater, soil gas, subslab soil gas, and indoor air samples. No additional buildings were identified for further evaluation.

At Site 78 South, groundwater samples collected from the surficial aquifer monitoring wells between September 2011 and May 2012 exhibited concentrations of VOCs exceeding GWSLs (**Table 17**). The samples with VOC concentrations exceeding GWSLs were collected from wells located within 100 ft of Buildings 1601 and 1603. Building 1601 is being investigated further as part of the Basewide VI evaluation in 2013 and results are pending. Building 1603 was not recommended for further investigation under the Basewide VI evaluation. Based on site conditions during the investigation, the VI pathway was not considered significant. VI at Building 1603 is being monitored as part of the ongoing Treatability Study at Site 78. No additional buildings were identified for further evaluation.

3 Conceptual Site Model

The Site 78 Conceptual Site Model is described in **Table 18,** followed by a summary of the nature and extent of groundwater contamination and depicted on **Figure 8**.

TABLE 18
Conceptual Site Model

Site Conditions	
Land Use and Physical Characteristics	Site 78 covers approximately 590 acres and includes maintenance shops, warehouses, painting shops, printing shops, auto body shops, and other small industrial facilities. The majority of the site area is paved (e.g., roadways, parking lots, loading dock areas, and storage lots); however, there are many small lawn areas associated with individual buildings within the site and along lengthy stretches of roadways. Recreational ball fields and a parade ground are located in the southwest corner of the site. The topography of the HPIA is relatively flat and ranges in elevation from 15 to 25 ft above mean sea level. In general, the area with the highest elevation is located in the northeastern portion of the HPIA and slopes gently to the southeast and south. The HPIA is drained by a series of road-side ditches and storm sewers that in turn flow into tributaries of Cogdels Creek, which discharges to the New River (**Figures 1** and **2**).
Geology	Undifferentiated Formation: 0 to 25 ft bgs. Sand, clay, sandy clay, and silt. Areas of perched groundwater are likely attributed to localized less-permeable clay lenses occluding rainwater from infiltrating the surficial aquifer. Belgrade Formation: 10 to 30 ft bgs. Laterally discontinuous clay layer. River Bend Formation: 30 to 150 ft bgs. Silty, medium-to-coarse-grained sand with shell fragments and cemented sands. Castle Hayne Formation: Greater than 150 ft bgs. Poorly indurated and well-indurated biomicrite and biomicrudite limestone.
Hydrogeology	Surficial Aquifer – Located within the undifferentiated formation and extends from the water table to 30 ft bgs. Groundwater flow is to the southwest. Areas of perched groundwater are present where precipitation accumulates within the vadose zone atop lenses of fine-grained materials. Groundwater depressions are present in Site 78 North, likely due to drawdown from the groundwater treatment system. Castle Hayne Aquifer: Located within the River Bend formation, it extends from 30 to 150 ft bgs and is divided into three units. • Upper Castle Hayne aquifer – 30 to 60 ft. bgs. Groundwater flow is to the southwest. • Middle Castle Hayne aquifer – 60 to 125 ft bgs. Groundwater flow is to the northwest (Site 78 North) and southwest (Site 78 South). • Lower Castle Hayne aquifer – 125 to 150 ft bgs. Groundwater flow is to the northwest (Site 78 North) and southwest (Site 78 South). Confining Unit – Where the Belgrade formation is present, the clay layer acts as a confining unit between the surficial aquifer and Castle Hayne aquifer, inhibiting vertical migration.
Source Areas	
Site 78 North	Historical and current industrial activities at the site are likely the source of CVOC contamination in the vicinity of Building 902 and the area between Holcomb Boulevard and Car Wash Road.
Site 78 South	BTEX contamination is likely related to releases from USTs. CVOC contamination in the vicinity of Building 1601 and Building 1603 is likely attributable to historical and current industrial activities.
Migration Pathways	
Groundwater	Groundwater in the surficial and upper Castle Hayne aquifers flows in a west/southwesterly direction toward the New River. Where the confining unit is not present, the surficial aquifer and Castle Hayne aquifers are hydraulically connected and vertical migration can occur. Contamination appears to be vertically influenced by lithologic units. Vertical migration may be retarded by the presence of localized sandy clay and silt layers. Groundwater elevation data collected during the confirmatory groundwater investigation were used to estimate the groundwater flow directions in the four hydrostratigraphic units. Potentiometric surface maps are shown on **Figures 9** through **12**.

TABLE 18
Conceptual Site Model

VI	Potential exists for VOC migration from groundwater into indoor air. Groundwater at Site 78 is being evaluated every five years to assess potential migration of CVOCs from contaminated groundwater into overlying buildings and evaluate potential risks to indoor air receptors. A VIMS was installed at Buildings 902 associated with Site 78. VIMS have also been installed at 10 buildings associated with the UST program. If new buildings are planned for construction in the vicinity of the groundwater plumes, the potential for a VI pathway will be evaluated and mitigated, if needed.
Potential Receptors	
Future Adult and Child Residential Receptors	Ingestion of or dermal contact with VOCs and metals in groundwater and pesticides and PCBs in soil; exposure to VOCs in indoor air
Current and Future Industrial Workers	Exposure to VOCs in indoor air through vapor intrusion
Current and Future Construction Workers	Dermal contact with VOCs in groundwater
Selected Remedy	
ROD (1994)	Soil removal to industrial levels (1995) Groundwater Extraction and Treatment System (1995-present) LTM for groundwater (1995-present) LUCs (2001-present) • Non-Industrial Use Control (Soil) • Intrusive Activities Control (Groundwater) • Aquifer Use Control (1,000 feet)

Nature and Extent of VOCs in Groundwater

Based on the results of the supplemental investigation presented above, VOC plumes were updated for each aquifer. **Figures 13** through **16** show the extent of BTEX and CVOC detections in groundwater, as well as the areas of BTEX and CVOC concentrations in exceedance of NCGWQS/MCLs for Site 78 North and Site 78 South, respectively. Summaries of the nature and extent of VOC groundwater contamination by aquifer for Site 78 North and Site 78 South are presented in this section.

Site 78 North

Surficial Aquifer

- BTEX and CVOC constituents were detected in the samples collected from the surficial aquifer (**Figures 13** and **14**), with benzene and cis-1,2-DCE detected the most frequently.
- The BTEX and CVOC plume configurations in the surficial aquifer are generally the same as defined by previous investigations , with the exception of detections of CVOCs in two newly installed wells to the northwest (IR78-GW113 and IR78-GW114) (**Figures 3, 13,** and **14**).
    - Two areas of BTEX detections in exceedance of NCGWQS/MCLs were identified: one near Building 902 and one in the center of the site within the HPFF. The extent of exceedances near Building 902 is delineated, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from monitoring wells IR78-MWVI01, IR78-GW22, IR78-GW40, IR78-GW48, and IR78-GW85. Groundwater samples were only collected from one monitoring well within the HPFF, IR78-GW22-1 and BTEX was detected but is being addressed by the UST program.

- The CSIA indicated that CVOCs detected northwest of Building 902 are likely not linked to contaminant sources at Building 902. As a result, two plumes of CVOCs detected in exceedance of NCGWQS/MCLs were identified: one near Building 902 and one to the northwest of Building 902. In the vicinity of Building 902, the CVOC plume is delineated, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from monitoring wells IR78-GW22, IR78-GW25, IR78-GW40, IR78-GW113, and IR78-GW115. An isolated PCE and TCE exceedance of NCGWQS/MCLs was detected in the groundwater sample collected from monitoring well IR78-GW114, located northwest of Building 902.
- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Intrusive Activities Control boundary, with the exception of IR78-GW114 (**Figure 14**), located to the northwest, and IR78-GW22-1 (**Figure 13**), located within the HPFF. Monitoring well IR78-GW22-1 is also located just outside of the existing Aquifer Use Control boundary.

Upper Castle Hayne Aquifer

- BTEX and CVOCs were detected in the groundwater samples collected from the upper Castle Hayne aquifer (**Figures 13** and **14**), with benzene and cis-1,2-DCE detected the most frequently.
- The BTEX and CVOC plume configurations within the upper Castle Hayne aquifer are generally the same as defined by previous investigations, with the exception of detections of CVOCs in one newly installed well to the northwest (IR78-GW117UCH) (**Figures 3, 13,** and **14**).
    - Two areas of BTEX detections in exceedance of NCGWQS/MCLs are present: one in the area west of Birch Street and one in the vicinity of Building 902. The BTEX plume located west of Birch Street, identified during a previous investigation of the HPIA (CH2M HILL, 2010), is not defined downgradient, as indicated by a concentration of benzene (4.3 μg/L) exceeding the NCGWQS in the sample from IR78-GW82IW. CVOCs were detected in two samples collected from this area at concentrations below NCGWQS/MCLs, indicating that the BTEX plume is comingled with CVOCs. The BTEX plume in the vicinity of Building 902 is generally defined, as indicated by concentrations of benzene in upgradient well IR78-RW11 (1.2 μg/L) and downgradient well IR78-GW85IW (1.4 μg/L), which only slightly exceed the NCGWQS of 1.0 μg/L.
    - The CSIA indicated that CVOCs detected northwest of Building 902 are likely not linked to contaminant sources at Building 902. As a result, two areas of CVOC detections in exceedance of NCGWQS/MCLs were identified: one in the vicinity of Building 902 and one in the area northwest of Building 902. The CVOC plume near Building 902 is defined downgradient, as indicated by the absence of CVOCs detected at concentrations exceeding NCGWQS/MCLs in the sample collected from IR78-GW85IW (**Figure 14**). Isolated detections of CVOCs exceeding NCGWQS/MCLs were detected in the sample collected from IR78-GW117UCH, located to the northwest of Building 902.
    - Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control boundary, with the exception of the wells located west of Birch Street.

Middle Castle Hayne Aquifer

- During installation of monitoring well IR78-GW90MCH, a fine-grained silt and sandy clay was observed just below poorly sorted gravelly sand near 100 ft bgs, which appears to locally stratify contamination in this area. Monitoring wells in the middle Castle Hayne aquifer were screened either above or just below this layer. Therefore, the middle Castle Hayne aquifer is evaluated as two zones: wells screened above the sandy clay layer, from 70 to 90 ft bgs, and those screened below it, from 95 to 110 ft bgs.

- Within the 70- to 90-foot zone:
    - BTEX and CVOCs were detected in the samples collected from this portion of the middle Castle Hayne aquifer (**Figures 13** and **14**), with benzene, cis-1,2-DCE, and VC the most frequently detected.
    - The BTEX and CVOC plume configurations within this portion of the middle Castle Hayne aquifer are different than defined by previous investigations.
        - Three areas of BTEX detections at concentrations greater than NCGWQS/MCLs have been identified within this zone: near Building 902, to the northwest of Building 902, and west of Birch Street. Benzene was detected at a concentration of 130 µg/L in the groundwater sample collected from monitoring well IR78-GW92MCH, located northwest and downgradient of Building 902, while benzene was detected at concentrations up to two orders of magnitude lower in samples collected upgradient in the vicinity of Building 902, suggesting that the BTEX plumes within Site 78 North are not connected. The extent of BTEX constituents exceeding NCGWQS/MCLs near Building 902 has been defined, as indicated by the absence of BTEX detections above NCGWQS/MCLs in the groundwater samples collected from upgradient wells IR78-GW24-2 and IR78-GW87MCH, side gradient wells IR78-GW98MCH and IR78-GW101MCH, and downgradient well IR78-GW89MCH. The extent of BTEX constituents exceeding NCGWQS/MCLs northwest of Building 902 is generally defined, as indicated by the absence of BTEX constituents above NCGWQS/MCLs in the groundwater samples collected from upgradient well IR78-GW101MCH and downgradient monitoring well IR78-GW102MCH. West of Birch Street, benzene was detected at a concentration of 59 µg/L in the groundwater sample collected from monitoring well IR78-GW80DW. The extent of BTEX constituents exceeding NCGWQS/MCLs is generally defined downgradient as indicated by no detections above NCGWQS/MCLs in the sample collected from IR78-GW81DW.
        - The CSIA indicated that CVOCs detected northwest of Building 902 are likely not linked to contaminant sources at Building 902. As a result, two areas of CVOC detections at concentrations greater than NCGWQS/MCLs have been identified in this zone: near Building 902 and to the northwest of Building 902. Near Building 902, VC is detected at concentrations exceeding NCGWQS. These detections are delineated laterally, as indicated by the absence of CVOC detections above NCGWQS/MCLs in the groundwater samples collected from IR78-GW24-2, IR78-GW98MCH, and IR78-GW101MCH. VC detections near Building 902 are not delineated in the downgradient area between the two plumes. In the area northwest of Building 902, PCE and daughter products were detected at concentrations in exceedance of NCGWQS/MCLs. These detections are not delineated laterally to the south or upgradient between the two plumes; however, they are delineated laterally to the north and downgradient, as indicated by the absence of CVOC detections above NCGWQS/MCLs in groundwater samples collected from monitoring wells IR78-GW89MCH and IR78-GW102MCH, respectively.
- Within the 95 to 110-foot zone:
    - BTEX and CVOCs were detected in the groundwater samples collected from this portion of the middle Castle Hayne aquifer (**Figures 13** and **14**), with cis-1,2-DCE and VC the most frequently detected.
    - The BTEX and CVOC plume configurations within this portion of the middle Castle Hayne aquifer are different than defined by previous investigations.
        - One BTEX constituent, benzene, was detected above NCGWQS in one groundwater sample (IR78-GW90MCH). As shown on **Figure 13**, the extent of BTEX concentrations exceeding NCGWQS/MCLs is defined, as indicated by the absence of BTEX constituents at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from upgradient monitoring well IR78-GW101MCH, lateral wells IR78-GW93MCH and IR78-GW96MCH, and downgradient monitoring well IR78-GW103MCH.

- A CVOC plume was identified for the first time in this zone in the area northwest of Building 902. As shown on **Figure 14**, the downgradient extent of CVOC concentrations exceeding NCGWQS/MCLs is generally defined, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from IR78-GW103MCH; however, the upgradient and lateral extent of exceedances is not defined.
- The highest CVOC concentrations detected at Site 78 North were in groundwater samples collected from monitoring well IR78-GW90MCH, screened within fine-grained silt and sandy clay. Total CVOC concentrations detected in IR78-GW116MCH, screened below the sandy clay, were an order of magnitude lower than those detected in the sample collected from IR78-GW90MCH, suggesting that vertical migration of VOCs is retarded by the sandy clay layer (**Figure 5**). In the vicinity of IR78-GW90MCH, the lithology transitions from a gravelly sand at approximately 92 ft bgs to more fine-grained silt and sandy clay to 106 ft bgs. As shown on the boring logs for IR78-GW90MCH and IR78-GW91LCH (**Attachment A**), a higher PID reading (61 ppm) was measured within the gravelly sand. These results suggest that the VOC mass in this area of the site is most likely located just above the fine-grained silt and sandy clay layer.

- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs in the middle Castle Hayne aquifer are located within the existing Aquifer Use Control boundary, with the exception of IR78-GW80DW, located west of Birch Street, and the inferred extent of VOC concentrations in the area northwest of Building 902.

Lower Castle Hayne Aquifer

- BTEX and CVOCs were detected in the samples collected from the lower Castle Hayne aquifer (**Figures 13** and **14**), with benzene the most frequently detected.
- Isolated detections of VOCs at concentrations above NCGWQS/MCLs were identified, including benzene and VC in the groundwater sample collected from monitoring well IR78-GW30-3 and methylene chloride in the groundwater sample collected from monitoring well IR78-GW91LCH.
- The vertical extent of TCE contamination in the vicinity of IR78-GW90MCH has been defined, as indicated by the absence of TCE and its daughter products at concentrations above method detection limits in the groundwater sample collected from monitoring well IR78-GW91LCH (**Figure 14**).
- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control.

Site 78 South

Surficial Aquifer

- BTEX and CVOC constituents were detected in the groundwater samples collected from the surficial aquifer (**Figures 15** and **16**), with TCE and cis-1,2-DCE detected the most frequently.
- The BTEX and CVOC plume configurations in the surficial aquifer are generally the same as defined by previous investigations (**Figures 3, 15,** and **16**).
    - BTEX constituents were detected above NCGWQS/MCLs in two areas of Site 78 South: southwest of the intersection of Fir Street and East Road and near Building 1603 (**Figure 15**). Southeast of the intersection of Fir Street and East Road, the extent of BTEX is generally delineated, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in the groundwater samples collected from upgradient monitoring well IR78-GW10 and downgradient monitoring well IR78-GW73. Near Building 1603, the extent of BTEX is generally delineated, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in the groundwater samples collected from upgradient well IR78-RW14, sidegradient well IR78-GW04-1, and downgradient wells IR78-GW50 and IR78-GW107. Measurable light non-aqueous phase liquid (LNAPL) was encountered at a thickness of 2.38 ft in

monitoring well IR78-GW58R, located near the intersection of Gum Street and Hammond Road. Because IR78-GW58R is located near a UST site (UST 1617) and LNAPL is indicative of a release from a UST, the presence of LNAPL was reported to the Base Environmental Management Division for further evaluation within the UST program.

- Three areas of CVOC detections at concentrations greater than NCGWQS/MCLs are present within the investigation area: one located near Building 1601, one located southwest of Gum Street, and one associated with UST Site 1613 near Holcomb Boulevard (**Figure 16**). Near Building 1601, the upgradient extent of CVOCs is defined by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from IR78-GW10. The downgradient extent of CVOCs in this area is generally defined as indicated by the absence of CVOCs in the groundwater samples collected from IR78-GW51R and IR78-GW53R. Southwest of Gum Street, the CVOC plume is delineated as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/ MCLs in groundwater samples collected from sidegradient wells IR78-GW02, IR78-GW03, IR78-GW04-1, and IR78-GW50 and downgradient monitoring wells IR78-GW62, IR78-GW63, IR78-GW64, and IR78-GW68. The upgradient extent of this CVOC plume is generally defined as indicated by the absence of CVOCs in the samples collected from IR78-GW51R, IR78-GW53R, and IR78-GW04-1.

  BTEX and CVOCs were detected in groundwater samples collected from UST Site 1613 during a previous investigation of the HPIA (CH2M HILL, 2010). UST Site 1613 is located within the Site 94 boundary, which is also within the Site 78 boundary. The BTEX constituents detected in the groundwater samples collected from UST 1613 have been managed under the UST program. In 2007 an *in-situ* Submerged Oxygen Curtain (iSOC) system was installed to facilitate removal of residual petroleum contamination and was removed in 2011 (Catlin, 2013). The CVOC detections at Site UST 1613 were further investigated as part of the Site 94 investigations and were determined to be migrating from Site 78; therefore, the Site 94 ROD designated that the CVOCs be addressed as part of the Site 78 groundwater remediation (CH2M HILL, 2006).

  Analytical results from UST Site 1613 are included for evaluation on **Figures 15** and **16**. Concentrations of BTEX above the NCGGWQS/MCLs were detected in samples collected from three monitoring wells (UST1613-MW17, UST1613-MW19, and UST1613-MW22). Concentrations of CVOCs above the NCGGWQS/MCLs were detected in samples collected from three monitoring wells (UST1613-MW03, UST1613-MW17, and UST1613-MW22). The BTEX and CVOC detections near UST Site 1613 are generally delineated downgradient, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from UST1613-MW08 during the previous HPIA investigation (CH2M HILL, 2010). Based on the flow of groundwater to the southwest, these detections do not appear to be connected to the plumes near Building 1601.

- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Intrusive Activities Control and/or Aquifer Use Control boundary.

Upper Castle Hayne

- During installation of monitoring well IR78-MW109UCH, a clay layer was observed at approximately 50 ft bgs. To evaluate the potential for local stratification of contamination in this area, monitoring wells were installed above and below this clay layer. Therefore, the upper Castle Hayne aquifer in Site 78 South is evaluated as two zones: wells screened above the clay layer, from 30 to 50 ft, and wells below the clay layer, from 50 to 60 ft.
- The MIP investigation suggested the presence of elevated VOC concentrations in the vicinity of Building 1603 from approximately 36 to 58 ft bgs. This is consistent with analytical data for groundwater samples collected from wells screened between 50 and 60 ft bgs, in the vicinity of the MIP investigation.

- Within the 30- to 50-foot zone:
    - BTEX and CVOCs were detected in the groundwater samples collected from this portion of the upper Castle Hayne aquifer, with benzene, toluene, TCE, and cis-1,2-DCE the most frequently detected.
    - The BTEX and CVOC plume configurations within this portion of the upper Castle Hayne aquifer are the same as defined by previous investigations (**Figures 3, 15, and 16**).
        - The operation of the groundwater treatment system in this zone is potentially influencing the plume configuration; therefore two areas of BTEX detections above NCGWQS/MCLs have been identified: one near Building 1601 and one southwest of Gum Street. The extent of BTEX at concentrations exceeding NCGWQS/MCLs is grossly defined in these areas, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from sidegradient wells IR78-RW05, IR78-RW06, IR78-RW08, and IR78-RW14 and downgradient wells IR78-GW67 and IR78-GW65. The upgradient extent of BTEX detections is not defined.
        - CVOC detections above NCGWQS/MCLs were identified in this zone near Building 1601. The downgradient extent of CVOC concentrations exceeding the NCGWQS/MCLs is defined, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from IR78-RW06, IR78-RW07, and IR78-RW08. However, an isolated exceedance of the NCGWQS/MCLs for VC was observed in the groundwater sample collected from IR78-GW65, located southeast of the CVOC plume originating at Building 1601.
        - CVOCs were detected in groundwater samples collected from Site 94 and UST Site 1613 during a previous investigation of the HPIA investigation (CH2M HILL, 2010). As described above, the Site 94 ROD indicated that CVOCs would be addressed as part of the Site 78 groundwater remediation (CH2M HILL, 2006).

          Analytical results have been included for evaluation on **Figure 16**. Concentrations of CVOCs above the NCGGWQS were detected in three samples collected from those sites; however, based on the flow of groundwater to the southwest, these detections do not appear to be connected to the plume near Building 1601. These detections are not delineated.
- Within the 50- to 60-foot zone:
    - BTEX and CVOCs were detected in the samples collected from this portion of the upper Castle Hayne aquifer, with cis-1,2-DCE and TCE the most frequently detected.
    - The VOC plume configurations within this portion of the upper Castle Hayne aquifer are different than defined by previous investigations.
        - BTEX constituents were not detected at concentrations exceeding NCGWQS/MCLs (**Figure 15**).
        - A CVOC plume was identified for the first time in this zone in the area adjacent to Building 1603 (**Figure 16**).
        - The extent of CVOC concentrations exceeding NCGWQS/MCLs is defined downgradient, as indicated by the absence of CVOC concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from IR78-GW108UCH. The extent of CVOC concentrations exceeding NCGWQS/MCLs is not defined upgradient or sidegradient.
        - During the confirmatory groundwater investigation, the highest concentrations of TCE detected in any sample collected from Site 78 were observed in the sample collected from IR78-GW109UCH. The boring log for IR78-GW109UCH indicated that a clay layer was present at that location. As a result, additional wells (IR78-GW121UCH and IR78-GW123UCH) were installed to further assess contamination above and below the clay layer. IR78-GW121UCH was installed adjacent to IR78-GW109UCH, and IR78-GW123UCH was installed 50 ft upgradient. A clay layer was not observed in

the borings of the two new wells; therefore, both were installed to the same depth as IR78-GW109UCH (60 ft bgs), with a shorter screen to target the aquifer unit below the clay layer. The concentrations of TCE detected in the groundwater samples collected from IR78-GW121UCH (11,000 μg/L) and IR78-GW109UCH (12,000 μg/L) were similar, indicating that there is no localized aquitard impeding vertical downward migration of VOCs in that area of the site (**Figure 6**).

- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control boundary.

Middle Castle Hayne

- BTEX and CVOC constituents were detected in the groundwater samples collected from the middle Castle Hayne aquifer (**Figures 15** and **16**), with toluene and TCE the most frequently detected.
- The VOC plume configurations within the middle Castle Hayne aquifer are different than as defined by previous investigations.
    - BTEX constituents were not detected at concentrations exceeding NCGWQS/MCLs. However, an isolated detection of the petroleum-related hydrocarbon 1,2-DCA was detected in the sample collected from IR78-GW17-2 at a concentration above the NCGWQS.
    - A CVOC plume was identified in the vicinity of Building 1601. The CVOC plume has been defined downgradient, as indicated by the absence of CVOC concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from IR78-GW110MCH, IR78-GW111MCH, and IR78-GW112MCH. The extent of CVOC concentrations exceeding NCGWQS/MCLs is not defined upgradient or sidegradient.
    - TCE was detected in two samples (IR78-GW105MCH, 80 ft bgs and IR78-GW128MCH, 105 ft bgs) at concentrations exceeding NCGWQS/MCL. CVOCs were not detected above method detection limits in the sample collected from IR78-GW106MCH, located adjacent to IR78-GW105MCH and installed to a greater depth of 110 ft bgs, indicating that VOCs are delineated vertically in that location. IR78-GW128MCH is located adjacent to IR78-GW121UCH and indicates that TCE has migrated vertically in that location. However, the concentration of TCE detected in the groundwater sample collected from IR78-GW128MCH (11 μg/L) is three orders of magnitude lower than the concentration detected in IR78-GW121UCH (11,000 μg/L).
- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control boundary.

Lower Castle Hayne Aquifer

- VOCs were not detected above method detection limits in any groundwater samples collected from the lower Castle Hayne aquifer (**Figure 6**).

4 Conclusions

The supplemental investigations conducted from 2011-2012 confirmed the results of the Rhea DPT investigation and further refined the extent of the groundwater VOC plumes through multiple phases of investigation within Site 78 North and South as presented below.

Site 78 North

The overall findings from the supplemental groundwater investigation conducted at Site 78 North are as follows:

- The VOC plumes are generally the same as defined by previous investigations in the vicinity of Building 902 and west of Birch Street. However, a CVOC plume was identified for the first time to the northwest of Building 902 in the surficial, upper, middle, and lower Castle Hayne aquifers.

- The VOC distribution within the area northwest of Building 902 appears to be stratified by lithology. In this area, the highest concentrations of VOCs are located just above the fine-grained silt and sandy clay layer within the middle Castle Hayne aquifer.
- The highest concentrations of BTEX constituents were detected in samples collected from the 70 to 90 ft bgs zone of the middle Castle Hayne aquifer in the vicinity of Building 902.The highest CVOC concentrations were detected in samples collected from the 90 to 110 ft bgs zone of the middle Castle Hayne aquifer northwest of Building 902.
- Evaluation of CSIA and VOC data indicates that there may be different sources of TCE contributing to the CVOC plumes identified northwest of Building 902 and in the vicinity of Building 902. The BTEX and CVOC plumes extend beyond the limits of the existing LTM well network and LUCs.
- Groundwater samples collected from the surficial aquifer monitoring wells contained concentrations of VOCs above GWSLs located near Buildings 902 and 903; however, the results are consistent with the previous Basewide VI evaluations. Building 902 has a VIMS installed and is included in the VIMS monitoring program and no further action was recommended at Building 903.

Site 78 South

The overall findings from the supplemental groundwater investigation conducted at Site 78 South are as follows:

- The VOC plumes within the surficial aquifer are generally the same as defined by previous investigations in the vicinity and south of Building 1601 and associated with UST Site 1613/Site 94. However, a VOC plume was identified for the first time in the area adjacent to Buildings 1601 and 1603 within the upper and middle Castle Hayne aquifers and is not fully delineated laterally. VOCs were not detected in groundwater samples collected from the lower Castle Hayne aquifer.
- The highest concentrations of BTEX constituents were detected in samples collected from the 30 to 50 ft bgs zone of the upper Castle Hayne aquifer and the highest CVOC concentrations were detected in samples collected from the 50 to 60 ft bgs zone of the upper Castle Hayne aquifer.
- The BTEX and CVOC plumes extend beyond the limits of the existing LTM well network and LUCs.
- Measurable LNAPL was encountered in monitoring well IR78-GW58R, located near the intersection of Gum Street and Hammond Road and is being addressed by the UST program.
- Groundwater samples collected from the surficial aquifer monitoring wells contained concentrations of VOCs above GWSLs located within 100 ft of Buildings 1601 and 1603. Building 1601 is currently being investigated further as part of the Basewide VI evaluation in 2013 and results are pending. VI at Building 1603 is being monitored as part of the ongoing Treatability study at Site 78. No additional buildings were identified for further evaluation.

5 Recommendations

Based on the results of the supplemental groundwater investigation, the LTM program and LUCs no longer encompass the extent of VOC contamination. Treatability Studies are planned within the area of highest VOC concentrations at Site 78 North and South to evaluate the effectiveness of alternate treatment technologies for long-term protectiveness. However, MILCON activities are currently underway to expand Holcomb Boulevard, which overlaps portions of Site 78 North. As a result, the Site 78 North Treatability Study has been put on hold pending MILCON completion; therefore, the Treatability Study will be conducted within the upper Castle Hayne aquifer at Site 78 South. In the short term, recommendations for changes to the LTM program and LUC boundaries are presented below.

Long-term Monitoring Program

The current LTM Program and recommendations for updates are summarized in **Table 19**. The locations of the current LTM wells and those recommended for inclusion into the LTM Program are shown on **Figures 17** through **23**. The monitoring wells that have been recommended for inclusion were selected based on the location relative to the VOC plumes within their respective aquifer and to provide a means of monitoring VOC concentrations over time and potential horizontal and vertical migration. These include upgradient, sentinel, and downgradient wells located near the leading edge of the plumes; wells located within the newly identified VOC plume areas that are outside of the current monitoring well network; and wells located in deeper aquifer zones.

The MILCON activities within Site 78 North have resulted in the destruction of some of the selected LTM wells. Because MILCON activities overlap areas where VOC plumes have not been defined, it is recommended that the Site 78 North LTM network be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs.

Within Site 78 South, groundwater samples collected from downgradient monitoring wells located east of McHugh Boulevard contained low detections of VOCs. These monitoring wells will be included in the LTM well network to monitor VOC concentrations and evaluate potential VOC migration. Where VOC plumes are not defined within Site 78 South, the installation of additional delineation wells has been proposed.

TABLE 19
Long-term Monitoring Program

	Aquifer	Monitoring Well	Monitoring Purpose
Site 78 North	Surficial	IR78-GW22	Lateral well
		IR78-GW24-1	Monitor concentrations within plume near Building 902
		IR78-GW41	Monitor concentrations within plume near Building 902
		IR78-GW46	Monitor concentrations within plume near Building 902
		IR78-GW85	Downgradient
		IR78-MWVI01	Monitor concentrations within plume near Building 902
		IR78-GW113	Downgradient
		IR78-GW114	Downgradient
		IR78-GW115	Upgradient, sentinel well
	Upper Castle Hayne	IR78-GW44	Monitor concentrations within plume near Building 902
		IR78-GW47	Monitor concentrations within plume near Building 902
		IR78-GW81IW	Monitor plumes west of Holcomb Blvd
		IR78-GW82IW	Monitor plumes west of Holcomb Blvd
		IR78-GW84IW	Monitor concentrations within plume near Building 902
		IR78-GW85IW	Downgradient; monitor concentrations within plume near Building 902
		IR78-RW10	Monitor concentrations within plume near Building 902
		IR78-RW11	Monitor concentrations within plume near Building 902
		IR78-RW12	Monitor concentrations within plume near Building 902
		IR78-GW117UCH	Lateral well
		IR78-GW79IW	Monitor plumes west of Holcomb Blvd
		IR78-GW80IW	Monitor plumes west of Holcomb Blvd
	Middle Castle Hayne	IR78-GW24-2	Monitor vertical migration and concentrations within plume near Building 902
		IR78-GW30-2	Monitor concentrations within plume near Building 902
		IR78-GW80DW	Monitor BTEX plume west of Holcomb Blvd

TABLE 19
Long-term Monitoring Program

	Aquifer	Monitoring Well	Monitoring Purpose
		IR78-GW81DW	Monitor BTEX plume west of Holcomb Blvd
		IR78-GW87MCH	Lateral well
		IR78-GW89MCH	Monitor concentrations within newly identified plume northwest of Building 902
		IR78-GW92MCH	Monitor concentrations within newly identified plume northwest of Building 902
		IR78-GW93MCH	Monitor concentrations within and along lateral edge of newly identified plume northwest of Building 902
		IR78-GW96MCH	Monitor concentrations within and along lateral edge of newly identified plume northwest of Building 902
		IR78-GW99MCH	Upgradient, sentinel well
		IR78-GW101MCH	Lateral well
		IR78-GW103MCH	Downgradient
		IR78-GW116MCH	Monitor concentrations within newly identified plume northwest of Building 902
	Lower Castle Hayne	IR78-GW30-3	Monitor potential vertical migration near Building 902
		IR78-GW91LCH	Monitor potential vertical migration northwest of Building 902
		IR78-GW94LCH	Monitor potential vertical migration northwest of Building 902
		IR78-GW104LCH	Downgradient
Site 78 South		IR78-GW04-1	Monitor contaminant concentrations
		IR78-GW10	Upgradient, sentinel well
		IR78-GW11	Upgradient, sentinel well
		IR78-GW42	Monitor contaminant concentrations
		IR78-GW49	Monitor contaminant concentrations
		IR78-GW50	Lateral edge of CVOC plume
		IR78-GW53R	Monitor contaminant concentrations
		IR78-GW54R	Monitor contaminant concentrations
		IR78-GW59	Monitor contaminant concentrations
		IR78-GW60	Monitor contaminant concentrations
	Surficial	IR78-GW61	Lateral well
		IR78-GW62	Downgradient
		IR78-GW63	Downgradient edge of CVOC plume
		IR78-GW64	Downgradient edge of CVOC plume
		IR78-GW73	Monitor contaminant concentrations
		IR78-RW09R	Downgradient
		UST1613-MW03	Northwest plume
		UST1613-MW17	Northwest plume
		UST1613-MW22	Northwest plume
		IR78-GW56	Isolated CVOC detections
		IR78-GW66	Lateral edge of CVOC plume

TABLE 19
Long-term Monitoring Program

Aquifer	Monitoring Well	Monitoring Purpose
Upper Castle Hayne	IR78-GW52R	Monitor contaminant concentrations
	IR78-GW65	Isolated CVOC detections
	IR78-GW74	Monitor contaminant concentrations
	IR78-GW83IW	Lateral Well
	IR78-RW05	Lateral well
	IR78-RW06	Lateral well
	IR78-RW07	Downgradient edge of plume
	IR78-RW08	Lateral well
	IR78-RW14	Monitor contaminant concentrations
	IR78-RW15	Monitor contaminant concentrations
	IR78-GW108UCH	Downgradient of Building 1603
	UST1613-MW13	Northwest plume
	IR94-MW02IW	Northwest plume
	IR94-MW03IW	Monitor concentrations north of Holcomb Boulevard
	Three recommended new wells	Upgradient, lateral, and downgradient of Building 1603
Middle Castle Hayne	IR78-GW86DW	Monitor contaminant concentrations
	IR78-GW105MCH	Monitor concentrations near Building 1601
	IR78-GW112MCH	Monitor concentrations downgradient
	IR78-GW128MCH	Monitor concentrations near Building 1603
	One recommended new well	Downgradient and lateral of Building 1603
Lower Castle Hayne	IR78-GW09-3	Monitor contaminant concentrations
	IR78-GW129LCH	Vertical migration near Building 1603

Land Use Control Boundaries

Based on the current extent of the BTEX and CVOC plumes that extend beyond the limits of existing LUCs, updates to LUC boundaries are recommended for Site 78 North and Site 78 South. The HPFF area is being addressed separately by the UST Program under a corrective action plan. The following updates are proposed (**Figure 24**):

- Update the Intrusive Activities Control boundary to encompass VOC exceedances of the NCGWQS/MCL within the surficial aquifer in order to be protective of potential construction workers.
- Update the Aquifer Use Control boundary to extend 1,000 ft from monitoring wells in which VOCs were detected above NCGWQS/MCL in any aquifer.
- Add a LUC for Intrusive and Industrial/Non-Industrial Use Controls to evaluate future buildings and land use for potential VI pathways, prior to construction, within 100 ft of surficial and Castle Hayne groundwater VOCs exceeding NCGWQS/MCLs.

6 References

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Tables

TABLE 2

Groundwater Sampling Summary

Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW01	PDB	9/15/2011	25	2	5-25	32.92	NA	14.94	--	Surficial	17.98
IR78-GW02	PDB	9/15/2011	20	2	5-20	32.15	29.90	6.71	--	Surficial	25.44
IR78-GW03	PDB	9/14/2011	25	2	5-25	31.85	29.50	6.13	--	Surficial	25.72
IR78-GW04-1	PDB	9/14/2011	25	2	5-25	31.63	28.90	20.21	--	Surficial	11.42
IR78-GW04-2	PDB	9/14/2011	75	4	65-75	31.01	28.90	19.40	--	MCH	11.61
IR78-GW05	PDB	9/15/2011	25	2	5-25	28.40	28.60	11.13	--	Surficial	17.27
IR78-GW08	PDB	9/16/2011	25	2	5-25	28.72	26.30	13.31	--	Surficial	15.41
IR78-GW09-1	PDB	9/12/2011	22	2	7-22	24.15	24.46	11.15	--	Surficial	13.00
IR78-GW09-3	PDB	9/12/2011	150	2	130-150	23.42	23.80	11.18	--	LCH	12.24
IR78-GW10	PDB	9/15/2011	25	2	5-25	28.13	25.70	12.14	--	Surficial	15.99
IR78-GW11	PDB	9/15/2011	25	2	5-25	28.22	25.50	12.80	--	Surficial	15.42
IR78-GW12	PDB	9/14/2011	25	2	5-25	30.08	27.60	11.25	--	Surficial	18.83
IR78-GW13	PDB	9/17/2011	25	2	5-25	26.20	23.80	12.22	--	Surficial	13.98
IR78-GW14	PDB	9/16/2011	25	2	5-25	27.32	25.00	8.34	--	Surficial	18.98
IR78-GW16	PDB	9/16/2011	25	2	5-25	32.40	30.10	12.55	--	Surficial	19.85
IR78-GW17-1	PDB	9/16/2011	25	2	5-25	30.00	27.50	11.73	--	Surficial	18.27
IR78-GW17-2	PDB	9/16/2011	73	2	53-73	32.14	29.60	10.49	--	MCH	21.65
IR78-GW17-4	PDB	9/17/2011	20	2	10-20	NA	NA	10.49	--	Surficial	NA
IR78-GW19	Not Sampled[1]	--	25	2	5-25	29.07	26.50	5.43	--	Surficial	23.64
IR78-GW20	PDB	9/16/2011	25	2	5-25	25.33	22.50	8.91	--	Surficial	16.42
IR78-GW21	PDB	9/17/2011	25	2	5-25	33.51	31.20	9.80	--	Surficial	23.71
IR78-GW22	PDB	9/16/2011	25	2	5-25	31.92	30.40	7.19	--	Surficial	24.73
IR78-GW22-1	PDB	9/18/2011	25	2	15-25	31.49	29.50	12.35	--	Surficial	19.14
IR78-GW23	PDB	9/15/2011	25	2	5-25	31.23	30.00	10.80	--	Surficial	20.43
IR78-GW24-1	PDB	9/13/2011	25	2	5-25	32.84	30.50	7.72	--	Surficial	25.12
IR78-GW24-2	PDB	9/13/2011	77	2	57-77	33.73	30.40	13.61	--	MCH	20.12
IR78-GW24-3	PDB	9/13/2011	148	2	128-148	32.32	30.50	13.83	--	LCH	18.49
IR78-GW25	PDB	9/15/2011	25	2	5-25	32.58	30.10	9.60	--	Surficial	22.98
IR78-GW26	PDB	9/16/2011	25	2	5-25	34.95	32.62	9.60	--	Surficial	25.35
IR78-GW29	PDB	9/14/2011	25	2	5-25	28.82	26.43	21.02	--	Surficial	7.80
IR78-GW30-2	PDB	9/16/2011	75	4	65-75	29.75	29.96	12.6	--	MCH	17.15
IR78-GW30-3	PDB	9/16/2011	150	4	140-150	29.72	29.96	12.9	--	LCH	16.82

TABLE 2

Groundwater Sampling Summary

Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW31-2	PDB	9/15/2011	75	4	65-75	26.24	26.50	10.85	--	MCH	15.39
IR78-GW31-3	PDB	9/15/2011	150	4	140-150	25.99	26.30	10.83	--	LCH	15.16
IR78-GW32-2	PDB	9/27/2011	75	4	64-75	27.11	27.28	11.7	--	MCH	15.41
IR78-GW32-3	PDB	9/27/2011	150	4	140-150	26.30	26.85	11.8	--	LCH	14.50
IR78-GW34	PDB	9/16/2011	13	4	3-13	32.66	29.90	6.94	--	Surficial	25.72
IR78-GW35	PDB	9/16/2011	20	4	10-20	32.08	29.20	13.69	--	Surficial	18.39
IR78-GW36	PDB	9/14/2011	18	4	8-18	29.68	26.90	12.50	--	Surficial	17.18
IR78-GW37	PDB	9/14/2011	14	4	4-14	20.02	18.20	7.90	--	Surficial	12.12
IR78-GW39	PDB	9/17/2011	20	4	10-20	19.44	18.36	15.05	--	Surficial	4.39
IR78-GW40	PDB	9/15/2011	25	2	4-24	31.34	30.26	10.90	--	Surficial	20.44
IR78-GW42	PDB	9/15/2011	23	2	3-23	28.52	NA	18.06	--	Surficial	10.46
IR78-GW43	PDB	9/15/2011	30	1	25-30	29.94	30.20	10.49	--	Surficial	19.45
IR78-GW44	PDB	9/16/2011	31	1	26-31	30.25	30.50	10.77	--	UCH	19.48
IR78-GW45R	PDB	9/15/2011	22	2	11.5-21.5	27.65	27.82	8.52	--	Surficial	19.13
IR78-GW46	PDB	9/15/2011	23	1	18-23	30.51	30.70	10.20	--	Surficial	20.31
IR78-GW47	PDB	9/15/2011	30	2	25-30	29.76	30.10	9.82	--	Surficial	19.94
IR78-GW48	PDB	9/16/2011	23	1	18-23	29.21	29.40	8.72	--	Surficial	20.49
IR78-GW49	Could not locate	NA	31	1	26-31	NA	NA	NA	--	UCH	NA
IR78-GW50	PDB	9/15/2011	23	1	18-23	29.32	29.57	18.08	--	Surficial	11.24
IR78-GW51R	PDB	9/15/2011	21	2	11-21	27.59	NA	17.15	--	Surficial	10.44
IR78-GW52R	PDB	9/15/2011	32	2	27-32	25.60	25.90	15.25	--	UCH	10.35
IR78-GW53R	PDB	9/15/2011	25	2	15-25	26.38	26.60	15.98	--	Surficial	10.40
IR78-GW54R	PDB	9/14/2011	25	2	15-25	28.50	28.90	18.72	--	Surficial	9.78
IR78-GW55	DRY WELL	NA	24	1	18.5	29.13	NA	DRY	--	Surficial	5.63
IR78-GW56	PDB	9/14/2011	30	1	25-30	29.21	29.51	--	--	Surficial	--
IR78-GW57	PDB	9/15/2011	28	1	23-28	29.33	29.58	18.41	--	Surficial	10.92
IR78-GW58R	PDB	not sampled	25	2	15-25	26.39	NA	17.71	15.33	Surficial	10.72
IR78-GW59	PDB	9/14/2011	25	1	20	28.11	28.38	17.52		Surficial	10.59
IR78-GW60	PDB	9/15/2011	30	1	25-30	26.84	27.10	13.3	--	Surficial	13.54
IR78-GW62	Could not locate	NA	30	1	25-30	25.62	25.81	NA	--	Surficial	NA
IR78-GW63	PDB	9/14/2011	29	1	24-29	27.97	28.17	18.68	--	Surficial	9.29
IR78-GW64	PDB	9/14/2011	28	1	23-28	26.90	27.13	17.71	--	Surficial	9.19

TABLE 2

Groundwater Sampling Summary

Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW65	PDB	9/14/2011	32	1	27-32	27.91	28.12	18.32	--	UCH	9.59
IR78-GW66	PDB	9/14/2011	30	1	24.5-29.5	27.28	27.48	17.27	--	Surficial	10.01
IR78-GW67	Could not locate	NA	33	1	27.5	29.28	29.51	NA	--	UCH	NA
IR78-GW68	PDB	9/14/2011	28	1	23-28	28.03	28.24	17.83	--	Surficial	10.20
IR78-GW71	Low-Flow	9/13/2011	38	0.75	33-38	30.05	30.05	10.40	--	UCH	19.65
IR78-GW72	Low-Flow	9/12/2011	38	0.75	33-38	29.90	29.90	10.25	--	UCH	19.65
IR78-GW73	Low-Flow	9/12/2011	25	0.75	25-30	25.66	25.66	11.71	--	Surficial	13.95
IR78-GW74	Low-Flow	9/12/2011	43	0.75	38-43	25.58	25.58	12.75	--	UCH	12.83
IR78-GW75-1	Low-Flow	9/13/2011	33	0.75	28-33	25.47	25.47	12.57	--	Surficial	12.90
IR78-GW75-2	Low-Flow	9/13/2011	43	0.75	38-43	25.09	25.31	12.45	--	UCH	12.64
IR78-GW76	Low-Flow	9/12/2011	23	0.75	18-23	25.74	25.74	11.99	--	Surficial	13.75
IR78-GW77	Low-Flow	9/12/2011	43	0.75	38-43	26.66	26.66	13.87	--	UCH	12.79
IR78-GW79IW	PDB	9/17/2011	60	2	50-60	22.71	22.94	11.48	--	UCH	11.23
IR78-GW80DW	PDB	9/17/2011	80	2	70-80	22.74	22.96	11.95	--	MCH	10.79
IR78-GW80IW	PDB	9/17/2011	60	2	50-60	22.50	22.95	10.01	--	UCH	12.49
IR78-GW81DW	PDB	9/16/2011	80	2	70-80	21.02	21.36	10.12	--	MCH	10.90
IR78-GW81IW	PDB	9/16/2011	60	2	50-60	20.95	21.20	9.94	--	UCH	11.01
IR78-GW82IW	PDB	9/17/2011	60	2	50-60	23.17	23.43	13.02	--	UCH	10.15
IR78-GW83IW	PDB	9/16/2011	60	2	50-60	19.21	19.54	9.63	--	UCH	9.58
IR78-GW84IW	PDB	9/13/2011	60	2	50-60	28.89	29.09	10.42	--	UCH	18.47
IR78-GW85	PDB	9/15/2011	20	2	7-17	29.87	27.12	7.89	--	Surficial	21.98
IR78-GW85IW	PDB	9/15/2011	60	2	50-60	29.74	26.58	11.58	--	UCH	18.16
IR78-GW86DW	PDB	9/17/2011	100	2	95-100	28.24	28.49	17.74	--	MCH	10.50
IR78-GW87MCH	PDB	9/16/2011	80	2	70-80	28.89	29.03	11.40	--	MCH	17.49
IR78-GW88UCH	PDB	9/15/2011	40	2	30-40	28.81	28.96	10.07	--	UCH	18.74
IR78-GW89MCH	PDB	9/16/2011	70	2	60-70	30.39	27.12	14.60	--	MCH	15.79
IR78-GW90MCH	PDB	9/16/2011	110	2	100-110	30.67	27.14	14.40	--	MCH	16.27
IR78-GW91LCH	PDB	9/16/2011	150	2	140-150	30.37	27.30	14.60	--	LCH	15.77
IR78-GW92MCH	PDB	9/16/2011	70	2	60-70	31.33	27.72	15.60	--	MCH	15.73
IR78-GW93MCH	PDB	9/16/2011	110	2	100-110	31.32	27.74	15.60	--	MCH	15.72
IR78-GW94LCH	PDB	9/16/2011	150	2	140-150	31.30	27.65	15.60	--	LCH	15.70
IR78-GW95MCH	PDB	9/16/2011	70	2	60-70	31.90	28.19	16.15	--	MCH	15.75

TABLE 2

Groundwater Sampling Summary

Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW96MCH	PDB	9/16/2011	110	2	100-110	31.85	28.40	16.17	--	MCH	15.68
IR78-GW97LCH	PDB	9/16/2011	150	2	140-150	31.88	28.33	16.25	--	LCH	15.63
IR78-GW98MCH	PDB	9/16/2011	90	2	80-90	28.57	28.77	12.8	--	MCH	15.77
IR78-GW99MCH	PDB	9/15/2011	80	2	70-80	28.09	28.30	9.30	--	MCH	18.79
IR78-GW100MCH	PDB	9/16/2011	70	2	60-70	33.39	30.00	17.30	--	MCH	16.09
IR78-GW101MCH	PDB	9/16/2011	70	2	60-70	31.62	28.69	13.60	--	MCH	18.02
IR78-GW102MCH	PDB	9/16/2011	70	2	60-70	27.59	25.17	13.41	--	MCH	14.18
IR78-GW103MCH	PDB	9/16/2011	110	2	100-110	27.72	25.19	14.00	--	MCH	13.72
IR78-GW104LCH	PDB	9/16/2011	150	2	140-150	27.60	25.14	14.80	--	LCH	12.80
IR78-GW105MCH	PDB	9/16/2011	80	2	70-80	24.16	24.40	12.60	--	MCH	11.56
IR78-GW106MCH	PDB	9/16/2011	110	2	100-110	24.12	24.37	12.55	--	MCH	11.57
IR78-GW107	PDB	9/15/2011	30	2	20-30	27.63	27.93	17.56	--	Surficial	10.07
IR78-GW108UCH	PDB	9/15/2011	60	2	50-60	27.79	27.85	17.75	--	UCH	10.04
IR78-GW109UCH	PDB	9/15/2011	60	2	50-60	26.63	26.75	16.11	--	UCH	10.52
IR78-GW110MCH	PDB	9/14/2011	90	2	80-90	26.83	27.24	19.35	--	MCH	7.48
IR78-GW111MCH	PDB	9/14/2011	90	2	80-90	25.97	25.81	17.76	--	MCH	8.21
IR78-GW112MCH	PDB	9/14/2011	90	2	80-90	29.88	26.68	21.56	--	MCH	8.32
IR78-GW113	PDB	5/22/2012	25	2	15-25	29.19	29.27	11.42*	--	Surficial	17.77
IR78-GW114	Low-Flow	5/23/2012	20	2	10-20	30.51	27.45	14.95*	--	Surficial	15.56
IR78-GW115	PDB	5/24/2012	25	2	15-25	28.19	28.34	5.88*	--	Surficial	22.31
IR78-GW116MCH	Low-Flow	3/30/2012	110	2	105-110	29.74	26.80	15.30*	--	MCH	14.44
IR78-GW117UCH	Low-Flow	5/24/2012	60	2	50-60	29.76	26.81	14.57*	--	UCH	15.19
IR78-GW121UCH	Low-Flow	4/5/2012	60	2	50-60	26.31	26.59	16.86*	--	UCH	9.45
IR78-GW122UCH[2]	PDB	5/22/2012	60	2	50-60	25.91	26.18	16.76*	--	UCH	9.15
IR78-GW123UCH	PDB	5/22/2012	60	2	50-60	25.86	26.19	16.70*	--	UCH	9.16
IR78-GW124UCH[2]	PDB	5/22/2012	60	2	50-60	25.96	26.16	16.78*	--	UCH	9.18
IR78-GW125MCH[2]	PDB	5/24/2012	90	2	80-90	29.98	27.61	15.59	--	MCH	14.39
IR78-GW126MCH	PDB	5/24/2012	90	2	80-90	30.13	27.10	15.71*	--	MCH	14.42
IR78-GW127MCH[2]	PDB	5/24/2012	90	2	80-90	30.15	27.21	15.71*	--	MCH	14.44
IR78-GW128MCH	PDB	5/22/2012	105	2	100-105	26.19	26.57	17.03*	--	MCH	9.16
IR78-GW129LCH	PDB	11/15/2012	150	2	145-150	26.56	26.85	15.92*	--	LCH	10.64
IR78-GWXXMCH	Low-Flow	5/24/2012	77	2	NA	NA	NA	14.37*	--	MCH	NA

TABLE 2

Groundwater Sampling Summary

Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-MWVI01	PDB	9/13/2011	13	2	3-13	NA	NA	5.64	--	Surficial	NA
IR78-RW02	Not Sampled	NA	35	6	25-35	NA	NA	19.18	--	UCH	NA
IR78-RW03	PDB	9/16/2011	35	6	25-35	NA	NA	10.30	--	UCH	NA
IR78-RW04	PDB	9/16/2011	35	6	25-35	NA	NA	--	--	UCH	NA
IR78-RW05	Low-Flow	9/14/2011	35	6	25-35	25.63	NA	14.62	--	UCH	11.01
IR78-RW06	Not Sampled	NA	35	6	25-35	NA	NA	NA	--	Surficial	NA
IR78-RW07	PDB	9/13/2011	35	6	25-35	24.77	NA	13.50	--	UCH	11.27
IR78-RW08	Not Sampled	NA	35	6	25-35	NA	NA	NA	--	Surficial	NA
IR78-RW09R	PDB	9/14/2011	25	2	15-25	25.91	26.21	15.98	--	UCH	9.93
IR78-RW10	Sample Port	9/13/2011	35	6	25-35	25.84	NA	6.70	--	UCH	19.14
IR78-RW11	Sample Port	9/13/2011	35	6	25-35	25.53	NA	7.00	--	UCH	18.53
IR78-RW12	Sample Port	9/13/2011	35	6	25-35	26.37	NA	7.54	--	UCH	18.83
IR78-RW13	Sample Port	9/16/2011	35	6	25-35	NA	NA	--	--	UCH	NA
IR78-RW14	Sample Port	9/16/2011	35	6	25-35	24.90	NA	18.16	--	UCH	6.74
IR78-RW15	Sample Port	9/13/2011	35	6	25-35	21.81	23.64	23.61	--	UCH	-1.80

Notes:

NA = Information not Available

* - Groundwater elevations were measured in 2012 and not included in the potentiometric surface maps, which were generated using data from 2011.

[1] - PDB not deployed due to silt filling screened interval

[2] - Well sampled as part of Treatability Study. Data not included in Expanded Groundwater Investigation

IR78- GWXXMCH represents an unidentifed well encountered during the Phase III investigation

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW22	IR78-GW22-1		IR78-GW23	IR78-GW24-1	IR78-GW24-2	IR78-GW24-3	IR78-GW25		IR78-GW26	IR78-GW30-2
Sample ID		IR78-GW22-11C	IR78-GW22-1-11C	IR78-GW22-1D-11C	IR78-GW23-11C	IR78-GW24-1-11C	IR78-GW24-2-11C	IR78-GW24-3-11C	IR78-GW25-11C	IR78-GW25D-11C	IR78-GW26-11C	IR78-GW30-2-11C
Sample Date		09/16/11	09/18/11	09/18/11	09/15/11	09/13/11	09/13/11	09/13/11	09/15/11	09/15/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	81	76	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	20	110	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	1 U	53	49	2.1	1 U	1 U	1 U	1 U	1 U	1 U	8.6
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	19	110	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	1 U	1	1.2	1.1	1 U	1 U	1 U	1 U	1 U	1 U	6.6
Isopropylbenzene	70	1 U	1 U	1 U	0.81 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	9	9.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	8.4
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	6.5	7.4	3.9	1 U	1 U	1 U	1 U	1 U	1 U	4.1
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	17	17	0.83 J	1 U	1.2	1 U	1 U	1 U	1 U	12
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1.4	3.8	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	3.3	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	6	2.5	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	16	17	4.4	3 U	3 U	3 U	3 U	3 U	3 U	12

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW30-3	IR78-GW34	IR78-GW35	IR78-GW40	IR78-GW43	IR78-GW44	IR78-GW45R	IR78-GW46	IR78-GW47	IR78-GW48	IR78-GW71
Sample ID		IR78-GW30-3-11C	IR78-GW34-11C	IR78-GW35-11C	IR78-GW40-11C	IR78-GW43-11C	IR78-GW44-11C	IR78-GW45R-11C	IR78-GW46-11C	IR78-GW47-11C	IR78-GW48-11C	IR78-GW71-11C
Sample Date		09/16/11	09/16/11	09/16/11	09/15/11	09/15/11	09/16/11	09/15/11	09/15/11	09/15/11	09/16/11	09/13/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.1
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	**120**	**250**	2 U	1.5 J	1.6 J	2 U	**430**
Benzene	1	**1.7**	1 U	1 U	1 U	**1.4**	1 U	1 U	**8**	**2.7**	1 U	**1.1**
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	**120**	**250**	1 U	1.5	1.6	1 U	**420**
Ethylbenzene	600	1 U	1 U	1 U	1 U	1.6	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	7.3	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	3.3	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1.1	1 U	1 U	1 U	5.5	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	3.9	3.1	1 U	1 U	1 U	1 U	8.4
Trichloroethene	3	1 U	1 U	1 U	1 U	0.97 J	1.8	1 U	1 U	**12**	1 U	**15**
Vinyl chloride	0.03	**3**	1 U	1 U	1 U	**56**	**110**	1 U	1 U	1 U	1 U	**250**
Xylene, total	500	3 U	3 U	3 U	3 U	11	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW72	IR78-GW79IW	IR78-GW80DW	IR78-GW80IW		IR78-GW81DW	IR78-GW81IW	IR78-GW82IW	IR78-GW84IW	IR78-GW85IW
Sample ID		IR78-GW72-11C	IR78-GW79IW-11C	IR78-GW80DW-11C	IR78-GW80IW-11C	IR78-GW80IWD-11C	IR78-GW81DW-11C	IR78-GW81IW-11C	IR78-GW82IW-11C	IR78-GW84IW-11C	IR78-GW85IW-11C
Sample Date		09/12/11	09/17/11	09/17/11	09/17/11	09/17/11	09/16/11	09/16/11	09/17/11	09/13/11	09/15/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	7.8	13	13	1 U	1 U	1 U	1 U	0.5 J
1,2-Dichloroethene (total)**	60	180	2 U	1.4 J	1.3 J	1.3 J	2 U	2 U	2 U	57	2 U
Benzene	1	1.3	6.4	59	180	180	1 U	1 U	4.3	0.77 J	1.4
cis-1,2-Dichloroethene	70	180	0.67 J	1.4	1.3	1.3	1 U	1 U	1 U	56	0.95 J
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	5.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1.9	1 U	1 U	2.1	2	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	110	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW85	IR78-GW87MCH	IR78-GW88UCH		IR78-GW89MCH	IR78-GW90MCH	IR78-GW91LCH	IR78-GW92MCH	IR78-GW93MCH
Sample ID		IR78-GW85-11C	IR78-GW87MCH-11C	IR78-GW88UCH-11C	IR78-GW88UCHD-11C	IR78-GW89MCH-11C	IR78-GW90MCH-11C	IR78-GW91LCH-11C	IR78-GW92MCH-11C	IR78-GW93MCH-11C
Sample Date		09/15/11	09/16/11	09/15/11	09/15/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1.6	1.7	1 U	15 J	1 U	1.1	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	7.7 J	1 U	6.9	1 U
1,2-Dichloroethene (total)**	60	2 U	1.4 J	46	42	300	8,900	2 U	61	86
Benzene	1	1 U	1	5.3	4.8	1 U	5.3 J	1 U	130	1 U
cis-1,2-Dichloroethene	70	1 U	1.4	39	35	200	6,700	1 U	50	86
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.1	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	9.6	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	6.3	140 J	1 U	0.76 J	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	7.5	6.9	100	2,200	1 U	11	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	150	9,500	1 U	35	1 U
Vinyl chloride	0.03	1 U	23	39	37	0.92 J	110 J	1 U	15	0.78 J
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW94LCH	IR78-GW95MCH	IR78-GW96MCH	IR78-GW97LCH	IR78-GW98MCH		IR78-GW99MCH	IR78-GW100MCH	IR78-GW101MCH
Sample ID		IR78-GW94LCH-11C	IR78-GW95MCH-11C	IR78-GW96MCH-11C	IR78-GW97LCH-11C	IR78-GW98MCH-11C	IR78-GW98MCHD-11C	IR78-GW99MCH-11C	IR78-GW100MCH-11C	IR78-GW101MCH-11C
Sample Date		09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/15/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	1.2 J
Benzene	1	0.85 J	1 U	1 U	1 U	1 U	1 U	1 U	32	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	0.76 J	0.67 J	1 U	1 U	1.2
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	6.5	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.6	1 U
Tetrachloroethene	0.7	1 U	1 U	0.99 J	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	16	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	0.64 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	95	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	12	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW102MCH	IR78-GW103MCH	IR78-GW104LCH	IR78-MWVI01		IR78-RW03	IR78-RW04	IR78-RW10	IR78-RW11	IR78-GW113	
Sample ID		IR78-GW102MCH-11C	IR78-GW103MCH-11C	IR78-GW104LCH-11C	IR78-MWVI01-11C	IR78-MWVI01-D-11C	IR78-RW03-11C	IR78-RW04-11C	IR78-RW10-11C	IR78-RW11-11C	IR78-GW113-12B	IR78-GW113D-12B
Sample Date		09/16/11	09/16/11	09/16/11	09/13/11	09/13/11	09/16/11	09/16/11	09/13/11	09/13/11	05/22/12	05/22/12
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Additional	
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	84	89	2 U	2 U	1.3 J	110	20	19
Benzene	1	1 U	1 U	1 U	2.2	2.3	1 U	1 U	4.6	1.2 J	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	0.51 J	1 U	82	87	1 U	1 U	1.3	100	20	19
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	4 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	10 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1.9	2.3	1 U	1 U	1 U	3.1	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	2.9	3	1 U	1 U	0.56 J	1.5 J	1.7 J	1.5 J
Vinyl chloride	0.03	1 U	1 U	1 U	25	25	1 U	1 U	1 U	240	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	6 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW114	IR78-GW115	IR78-GW116MCH		IR78-GW117UCH	IR78-GW126MCH	IR78-GWXXMCH	IR78-GW125MCH	IR78-GW127MCH
Sample ID		IR78-GW114-12B	IR78-GW115-12B	IR78-GW116MCH-12A	IR78-GW116MCHD-12A	IR78-GW117UCH-12B	IR78-GW126MCH-12B	IR78-GWXXMCH-12B	IR78-GW125MCH-12B	IR78-GW127MCH-12B
Sample Date		05/23/12	05/24/12	03/30/12	03/30/12	05/24/12	05/24/12	05/24/12	05/24/12	05/24/12
Groundwater Investigation Event		Additional	Additional	Additional		Additional	Additional	Additional	Treatability Study	Treatability Study
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	4.9 J	12 J	1 U	2.1	1 U	3	1.5 J
1,2-Dichloroethane	0.4	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	0.64 J	1 U
1,2-Dichloroethene (total)**	60	5	1 U	860	810	9.5	380 D	1 U	980 D	330 D
Benzene	1	1 U	1 U	5.7 U	5.7 U	1 U	0.88 J	2.4	1.5 J	0.9 J
cis-1,2-Dichloroethene	70	2.2	1 U	710	670	9	320 D	1 U	790 D	250 D
Ethylbenzene	600	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	11 U	11 U	2 U	2 U	2 U	2 J	2 U
Methylene Chloride	5	5 U	5 U	34 U	30 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	5.7 U	5.7 U	1 U	0.65 J	1 U	3	1 U
Tetrachloroethene	0.7	14	1 U	47	44	1 U	89	1 U	190 D	68
Toluene	600	1 U	1 U	13 J	8.7 U	1 U	1 U	2.3	1 U	1 U
trans-1,2-Dichloroethene	100	2.8	1 U	150	140	1 U	73	1 U	190 D	81
Trichloroethene	3	9.5	1 U	2,700	2,500	23	1,100 D	1 U	1,900 D	1,100 D
Vinyl chloride	0.03	1 U	1 U	25 J	21 J	1.7 J	14	7.6	27	10
Xylene, total	500	3 U	3 U	5.7 U	5.7 U	3 U	3 U	3 U	5	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW01	IR78-GW02	IR78-GW03	IR78-GW04-1	IR78-GW04-2	IR78-GW05	IR78-GW08	IR78-GW09-1		IR78-GW09-3	
Sample ID		IR78-GW01-11C	IR78-GW02-11C	IR78-GW03-11C	IR78-GW04-1-11C	IR78-GW04-2-11C	IR78-GW05-11C	IR78-GW08-11C	IR78-GW09-1-11C	IR78-GW09-1-12B*	IR78-GW09-3-11C	IR78-GW09-3D-11C
Sample Date		09/15/11	09/15/11	09/14/11	09/14/11	09/14/11	09/15/11	09/16/11	09/12/11	05/22/12	09/12/11	09/12/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Treatability Study	Confirmatory	
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	5.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.93 J	2 U	2 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	5.1	1 U	1 U	1 U	1 U	1 U	1 U	0.75 J	0.93 J	1 U	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	9	1 U	1 U	1 U	1 U	1 U	1 U	40	44	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

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U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW10	IR78-GW11	IR78-GW12	IR78-GW13	IR78-GW14	IR78-GW16	IR78-GW17-1	IR78-GW17-2	IR78-GW17-4	IR78-GW20	
Sample ID		IR78-GW10-11C	IR78-GW11-11C	IR78-GW12-11C	IR78-GW13-11C	IR78-GW14-11C	IR78-GW16-11C	IR78-GW17-1-11C	IR78-GW17-2-11C	IR78-GW17-4-11C	IR78-GW20-11C	IR78-GW20D-11C
Sample Date		09/15/11	09/15/11	09/14/11	09/17/11	09/16/11	09/16/11	09/16/11	09/16/11	09/17/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.4	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

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U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW21	IR78-GW29		IR78-GW31-2	IR78-GW31-3	IR78-GW32-2	IR78-GW32-3		IR78-GW36		IR78-GW37
Sample ID		IR78-GW21-11C	IR78-GW29-11C	IR78-GW29D-11C	IR78-GW31-2-11C	IR78-GW31-3-11C	IR78-GW32-2-11C	IR78-GW32-3-11C	IR78-GW32-3D-11C	IR78-GW36-11C	IR78-GW36D-11C	IR78-GW37-11C
Sample Date		09/17/11	09/14/11	09/14/11	09/15/11	09/15/11	09/27/11	09/27/11	09/27/11	09/14/11	09/14/11	09/14/11
Groundwater Investigation Event		Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory		Confirmatory		Confirmatory
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW39	IR78-GW42	IR78-GW50	IR78-GW51R	IR78-GW52R	IR78-GW53R	IR78-GW54R	IR78-GW56	IR78-GW57	IR78-GW59
Sample ID		IR78-GW39-11C	IR78-GW42-11C	IR78-GW50-11C	IR78-GW51R-11C	IR78-GW52R-11C	IR78-GW53R-11C	IR78-GW54R-11C	IR78-GW56-11C	IR78-GW57-11C	IR78-GW59-11C
Sample Date		09/17/11	09/15/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11	09/15/11	09/14/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethane	6	1 U	**120**	1 U	1 U	1.2	2 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	**14**	1 U	1 U	0.94 J	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	**1 U**	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	**500**	2 U	2 U	**81**	4 U	2.4	2 U	2 U	3.1
Benzene	1	1 U	**2.6**	1 U	1 U	**9.1**	**220**	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	**500**	1 U	1 U	**81**	2 U	2.4	0.77 J	0.57 J	3.1
Ethylbenzene	600	1 U	1 U	1 U	1 U	60	52	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	4.7	2 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	24	37	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	0.95 J	1 U	1 U	9.7	17	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	2.5	1 U	1 U	6.7	110	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	2.1	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	**8.1**	1 U	1 U	1 U	2 U	1 U	1.2	1 U	1 U
Vinyl chloride	0.03	1 U	**140**	1 U	1 U	**180**	2 U	**1.2**	1 U	**0.78 J**	**1.4**
Xylene, total	500	3 U	3 U	3 U	3 U	34	54	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

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**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW60		IR78-GW63	IR78-GW64	IR78-GW65	IR78-GW66	IR78-GW68	IR78-GW73	IR78-GW74
Sample ID		IR78-GW60-11C	IR78-GW60-12B	IR78-GW63-11C	IR78-GW64-11C	IR78-GW65-11C	IR78-GW66-11C	IR78-GW68-11C	IR78-GW73-11C	IR78-GW74-11C
Sample Date		09/15/11	05/23/12	09/14/11	09/14/11	09/14/11	09/14/11	09/14/11	09/12/11	09/12/11
Groundwater Investigation Event		Confirmatory	Treatability Study	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	1 U	3.1	1 U	1 U	1	3.2	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	1.8 J	26	17	9.6	18	1.6 J	2 U	2 U	170
Benzene	1	1 U	25 UD	1 U	1 U	1 U	1 U	1 U	1 U	100
cis-1,2-Dichloroethene	70	1.8 J	25 JD	16	9.6	17	1.6	1.1	1 U	160
Ethylbenzene	600	1,900	670 D	1 U	1 U	1 U	1 U	1 U	1 U	1,200
Isopropylbenzene	70	160 J	26 JD	1 U	1 U	1 U	1 U	1 U	3.9	79
m- and p-Xylene	500	6,000	1,700 D	2 U	2 U	2 U	2 U	2 U	2 U	3,600
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	2,100	930 D	1 U	1 U	1 U	1 U	1 U	1 U	1,400
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	2.9
Toluene	600	210	56 D	1 U	1 U	1 U	1 U	1 U	1 U	2,200
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	420	170	2	1.4	0.9 J	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	2.1	41	1 U	1 U	1 U
Xylene, total	500	8,200	2,700 D	3 U	3 U	3 U	3 U	3 U	3 U	5,000

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW75-1			IR78-GW75-2	IR78-GW76		IR78-GW77	IR78-GW83IW	IR78-GW86DW	IR78-GW105MCH
Sample ID		IR78-GW75-1-11C	IR78-GW75-1D-11C	IR78-GW75-1-12B	IR78-GW75-2-11C	IR78-GW76-11C	IR78-GW76-12B	IR78-GW77-11C	IR78-GW83IW-11C	IR78-GW86DW-11C	IR78-GW105MCH-11C
Sample Date		09/13/11	09/13/11	05/23/12	09/13/11	09/12/11	05/23/12	09/12/11	09/16/11	09/17/11	09/16/11
Groundwater Investigation Event		Confirmatory		Treatability Study	Confirmatory	Confirmatory	Treatability Study	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethane	6	1 U	1 U	1 U	10 U	1 U	1 U	20 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	10 U	1 U	1 U	20 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	10 U	1 U	1 U	20 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	130	110	62	160	350	430 D	40 U	2 U	2 U	15
Benzene	1	1,000	1,100	130	120	1 U	1 U	20 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	130	110	61	160	400	430 D	20 U	1 U	1 U	14
Ethylbenzene	600	990	1,100	990 D	97	200	140	1,500	1 U	1 U	1 U
Isopropylbenzene	70	80	91	37	10 U	76	69	50	1 U	1 U	1 U
m- and p-Xylene	500	3,500	3,800	3,000 D	100	1,600	1,300 D	4,200	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	50 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1,500	1,700	1,400 D	38	480	470 D	1,300	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	10 U	1.1	1 J	20 U	1 U	1 U	1 U
Toluene	600	15,000	15,000	8,400 D	570	11	6.9	2,300	1 U	0.68 J	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	10 U	3	2.6	20 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1.9 J	11	420	330 D	200	1 U	1 U	28
Vinyl chloride	0.03	1.3	1.2	1.1 J	10 U	0.93 J	1.2 J	20 U	1 U	1 U	1 U
Xylene, total	500	5,100	5,400	4,400 D	140	2,100	1,800 D	5,500	3 U	3 U	3 U

Notes:

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J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW106MCH	IR78-GW107	IR78-GW108UCH		IR78-GW109UCH	IR78-GW110MCH	IR78-GW111MCH	IR78-GW112MCH	IR78-RW05
Sample ID		IR78-GW106MCH-11C	IR78-GW107-11C	IR78-GW108UCH-11C	IR78-GW108UCHD-11C	IR78-GW109UCH-11C	IR78-GW110MCH-11C	IR78-GW111MCH-11C	IR78-GW112MCH-11C	IR78-RW05-11C
Sample Date		09/16/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11	09/14/11	09/14/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	1 U	2.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	7	1 U	1 U	23 J	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	68	2 U	2 U	360	2 U	2 U	5	2 U
Benzene	1	1 U	0.59 J	1 U	1 U	0.64 J	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	67	1 U	1 U	360	1 U	1 U	5	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1.4 J	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	26	1 U	1 U	12,000	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	3.4	1 U	1 U	2.5 J	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-RW07		IR78-RW09R	IR78-RW12	IR78-RW13	IR78-RW14	IR78-RW15	IR78-GW121UCH	IR78-GW123UCH	IR78-GW128MCH
Sample ID		IR78-RW07-11C	IR78-RW07D-11C	IR78-RW09R-11C	IR78-RW12-11C	IR78-RW13-11C	IR78-RW14-11C	IR78-RW15-11C	IR78-GW121UCH-12B	IR78-GW123UCH-12B	IR78-GW128MCH-12B
Sample Date		09/13/11	09/13/11	09/14/11	09/13/11	09/16/11	09/16/11	09/13/11	04/05/12	05/22/12	05/22/12
Groundwater Investigation Event		Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Additional	Additional	Additional
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	4.8	1 U	1 U	40 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	2.3	1 U	1 U	40 U	3.5	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U
1,2-Dichloroethene (total)**	60	1.2 J	2 U	2 U	65	56	2 U	120	430	160	1 U
Benzene	1	1 U	1 U	1 U	4.7	13	1 U	100	40 U	1 U	1 U
cis-1,2-Dichloroethene	70	1.2	1	1 U	62	56	0.97 J	120	430	160	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	0.83 J	1 U	180	40 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	18	40 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	1.5 J	2 U	2 U	640	80 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	69 U	5 U	5 U
o-Xylene	500	0.65 J	1 U	1 U	0.75 J	0.81 J	1 U	200 J	40 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1	40 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	0.92 J	1 U	730 J	46 U	1 U	2.3
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	2.8	1 U	1 U	1 U	40 U	0.76 J	1 U
Trichloroethene	3	1 U	1 U	1 U	20	5.4	1.3	19	11,000	5,100 D	11
Vinyl chloride	0.03	1 U	1 U	1 U	7.5	45	1 U	1 U	40 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	2.2 J	3 U	3 U	840	40 U	3 U	3 U

Notes:

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D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 4
Groundwater Analytical Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS/MCL (April, 2013)**	IR78-GW129LCH	IR78-GW122UCH		IR78-GW124UCH
Sample ID		IR78-GW129LCH-12D	IR78-GW122UCH-12B	IR78-GW122UCHD-12B	IR78-GW124UCH-12B
Sample Date		11/15/12	05/22/12	05/22/12	05/22/12
Groundwater Investigation Event		Additional	Treatability Study		Treatability Study
Chemical Name					
Volatile Organic Compounds (µg/l)					
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	3.8	3.5	3
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	1 U	170	170	140
Benzene	1	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	170	170	140
Ethylbenzene	600	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U
Methylene chloride	5	1 U	5 U	5 U	5 U
o-Xylene	500	5 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1.3 J
trans-1,2-Dichloroethene	100	1 U	1.2 J	1.2 J	0.82 J
Trichloroethene	3	1 U	5,400 D	4,900 D	4,300 D
Vinyl chloride	0.03	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 9

Passive Soil Gas Analytical Results

Site 78 Technical Memorandum

Station ID	IR78-SG-100	IR78-SG-101	IR78-SG-102	IR78-SG-103	IR78-SG-104	IR78-SG-105	IR78-SG-106	IR78-SG-107	
Sample ID	IR78-SG-100-12A	IR78-SG-101-12A	IR78-SG-102-12A	IR78-SG-103-12A	IR78-SG-104-12A	IR78-SG-105-12A	IR78-SG-106-12A	IR78-SG-107-12A	IR78-SG-107 DUP-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	0.0	1.1	0.5	16.6	0.0	0.0	0.0	27.2	
Volatile Organic Compounds (ng)									
trans-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Toluene	**365**	<25	<25	<25	**109**	<25	**341**	<25	<25
Tetrachloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25

Notes:

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV bulb

ppm - parts per million

TABLE 9

Passive Soil Gas Analytical Results

Site 78 Technical Memorandum

Station ID	IR78-SG-108	IR78-SG-109	IR78-SG-110	IR78-SG-111	IR78-SG-112	IR78-SG-113		IR78-SG-114
Sample ID	IR78-SG-108-12A	IR78-SG-109-12A	IR78-SG-110-12A	IR78-SG-111-12A	IR78-SG-112-12A	IR78-SG-113-12A	IR78-SG-113 DUP-12A	IR78-SG-114-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	10.8	NM	0.0	0.0	0.0	45.8		19.5
Volatile Organic Compounds (ng)								
trans-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
Toluene	<25	<25	<25	**36**	**56**	**47**	**36**	<25
Tetrachloroethene	<25	<25	<25	<25	<25	<25	<25	<25

Notes:

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV l

ppm - parts per million

TABLE 9

Passive Soil Gas Analytical Results

Site 78 Technical Memorandum

Station ID	IR78-SG-115	IR78-SG-116	IR78-SG-117	IR78-SG-118	IR78-SG-119	IR78-SG-120	IR78-SG-121	IR78-SG-122	IR78-SG-123
Sample ID	IR78-SG-115-12A	IR78-SG-116-12A	IR78-SG-117-12A	IR78-SG-118-12A	IR78-SG-119-12A	IR78-SG-120-12A	IR78-SG-121-12A	IR78-SG-122-12A	IR78-SG-123-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	19.3	24.1	0.0	0.0	0.0	0.0	0.0	0.0	2.9
Volatile Organic Compounds (ng)									
trans-1,2-Dichloroethene	<25	**76**	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	**49**	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	<25	**2,087**	<25	<25	<25	<25	<25	<25	<25
Toluene	<25	**125**	<25	**40**	<25	**37**	<25	**45**	<25
Tetrachloroethene	<25	**2,212**	<25	<25	<25	<25	<25	<25	<25

Notes:

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV l

ppm - parts per million

TABLE 9

Passive Soil Gas Analytical Results

Site 78 Technical Memorandum

Station ID	IR78-SG-124	IR78-SG-125	IR78-SG-126		IR78-SG-127	IR78-SG-128	IR78-SG-129	IR78-SG-130
Sample ID	IR78-SG-124-12A	IR78-SG-125-12A	IR78-SG-126-12A	IR78-SG-126 DUP-12A	IR78-SG-127-12A	IR78-SG-128-12A	IR78-SG-129-12A	IR78-SG-130-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	0.0	0.0	0.0		0.0	0.0	0.0	2.3
Volatile Organic Compounds (ng)								
trans-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	**26**	<25	<25	<25	<25	<25	<25	<25
Toluene	<25	<25	**37**	**55**	<25	<25	<25	**50**
Tetrachloroethene	<25	<25	<25	<25	<25	<25	<25	<25

Notes:

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV l

ppm - parts per million

TABLE 13

CSIA Analytical Data

Site 78 Technical Memorandum

Well ID	^{37}Cl CSIA (per mil)	^{13}C CSIA (per mil)			VOC (mg/L)			Molar Concentration (mM)			Molar Fraction (%)		
	TCE	TCE	cis-DCE	VC	TCE	cis-DCE	VC	TCE	cis-DCE	VC	TCE	cis-DCE	VC
IR78-GW116MCH	4.3	-21.11	-22.46	-17.36	3,900	810	40	29.68	8.35	0.64	76.74	21.60	1.65
IR78-GW72	8.2	-6.77	-16.13	-18.65	4.4 J	150	160	0.03	1.55	2.56	0.81	37.37	61.82
IR78-GW114	1.4	-35.04	-	-	14	2.8 J	5 U	0.11	0.03	0.00	78.68	21.32	0.00
IR78-GW117UCH	4.3	-21.93	-24.37	-	50	13	5.1	0.38	0.13	0.08	63.83	22.49	13.68

Notes

mg/L - microgram per liter

mM- micromole

TABLE 16

Vapor Intrustion Screening Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS (Feb, 2012)**	**GWSL (Jan, 2014)**	IR78-GW22	IR78-GW22-1		IR78-GW23	IR78-GW24-1	IR78-GW25		IR78-GW26	IR78-GW34
Sample ID			IR78-GW22-11C	IR78-GW22-1-11C	IR78-GW22-1D-11C	IR78-GW23-11C	IR78-GW24-1-11C	IR78-GW25-11C	IR78-GW25D-11C	IR78-GW26-11C	IR78-GW34-11C
Sample Date			09/16/11	09/18/11	09/18/11	09/15/11	09/13/11	09/15/11	09/15/11	09/16/11	09/16/11
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	81	76	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	20	110	2 U	2 U	2 U	2 U
Benzene	1	69.3	1 U	53	49	2.1	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	19	110	1 U	1 U	1 U	1 U
Ethylbenzene	600	152	1 U	1	1.2	1.1	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	0.81 J	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	9	9.6	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	6.5	7.4	3.9	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	17	17	0.83 J	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1.4	3.8	1 U	1 U	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	3.3	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	25	1 U	1 U	1 U	6	2.5	1 U	1 U	1 U	1 U
Xylene, total	500	414	3 U	16	17	4.4	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of GWSL

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 16

Vapor Intrustion Screening Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS (Feb, 2012)**	**GWSL (Jan, 2014)**	IR78-GW35	IR78-GW40	IR78-GW45R	IR78-GW46	IR78-GW48	IR78-GW85	IR78-MWVI01	
Sample ID			IR78-GW35-11C	IR78-GW40-11C	IR78-GW45R-11C	IR78-GW46-11C	IR78-GW48-11C	IR78-GW85-11C	IR78-MWVI01-11C	IR78-MWVI01-D-11C
Sample Date			09/16/11	09/15/11	09/15/11	09/15/11	09/16/11	09/15/11	09/13/11	09/13/11
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	1.5 J	2 U	2 U	84	89
Benzene	1	69.3	1 U	1 U	1 U	8	1 U	1 U	2.2	2.3
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	1.5	1 U	1 U	82	87
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1.9	2.3
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	1 U	1 U	2.9	3
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	1 U	1 U	25	25
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of GWSL

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL val
conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 16

Vapor Intrustion Screening Data - Site 78 North

Site 78 Technical Memorandum

Station ID	**NCGWQS (Feb, 2012)**	**GWSL (Jan, 2014)**	IR78-GW113		IR78-GW114	IR78-GW115
Sample ID			IR78-GW113-12B	IR78-GW113D-12B	IR78-GW114-12B	IR78-GW115-12B
Sample Date			05/22/12	05/22/12	05/23/12	05/24/12
Chemical Name						
Volatile Organic Compounds (µg/l)						
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	20	19	5	1 U
Benzene	1	69.3	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	20	19	2.2	1 U
Ethylbenzene	600	152	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U
Methylene Chloride	5	3,960	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	14	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	2.8	1 U
Trichloroethene	3	4.4	1.7 J	1.5 J	**9.5**	1 U
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U
Xylene, total	500	414	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of GWSL

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL val
conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

J - Analyte present, value may or may not be accurate or precise

U - Not detected

µg/l - micrograms per liter

TABLE 17
Vapor Intrusion Screening Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS**	**GWSL**	IR78-GW01	IR78-GW02	IR78-GW03	IR78-GW04-1	IR78-GW05	IR78-GW08	IR78-GW09-1	IR78-GW10	IR78-GW11	IR78-GW12	IR78-GW13	IR78-GW14
Sample ID	**(Feb, 2012)**	**(Jan, 2014)**	IR78-GW01-11C	IR78-GW02-11C	IR78-GW03-11C	IR78-GW04-1-11C	IR78-GW05-11C	IR78-GW08-11C	IR78-GW09-1-11C	IR78-GW10-11C	IR78-GW11-11C	IR78-GW12-11C	IR78-GW13-11C	IR78-GW14-11C
Sample Date			09/15/11	09/15/11	09/14/11	09/14/11	09/15/11	09/16/11	09/12/11	09/15/11	09/15/11	09/14/11	09/17/11	09/16/11
Chemical Name														
Volatile Organic Compounds (µg/l)														
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	5.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	5.1	1 U	1 U	1 U	1 U	1 U	0.75 J	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	4.4	**9**	1 U	1 U	1 U	1 U	1 U	**40**	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS the more conservative MCL

Bold text indicates exceedance of GWSL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

J - Analyte present, value may or may not be accurate or

U - Not detected

µg/l - micrograms per liter

TABLE 17
Vapor Intrusion Screening Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS**	**GWSL**	IR78-GW16	IR78-GW17-1	IR78-GW17-4	IR78-GW20		IR78-GW21	IR78-GW29	
Sample ID	**(Feb, 2012)**	**(Jan, 2014)**	IR78-GW16-11C	IR78-GW17-1-11C	IR78-GW17-4-11C	IR78-GW20-11C	IR78-GW20D-11C	IR78-GW21-11C	IR78-GW29-11C	IR78-GW29D-11C
Sample Date			09/16/11	09/16/11	09/17/11	09/16/11	09/16/11	09/17/11	09/14/11	09/14/11
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS the more conservative MCL

Bold text indicates exceedance of GWSL

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL va
more conservative.

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U - Not detected

µg/l - micrograms per liter

TABLE 17
Vapor Intrusion Screening Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS**	**GWSL**	IR78-GW36		IR78-GW37	IR78-GW39	IR78-GW42	IR78-GW50	IR78-GW51R	IR78-GW53R	IR78-GW54R	IR78-GW56
Sample ID	**(Feb, 2012)**	**(Jan, 2014)**	IR78-GW36-11C	IR78-GW36D-11C	IR78-GW37-11C	IR78-GW39-11C	IR78-GW42-11C	IR78-GW50-11C	IR78-GW51R-11C	IR78-GW53R-11C	IR78-GW54R-11C	IR78-GW56-11C
Sample Date			09/14/11	09/14/11	09/14/11	09/17/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	120	1 U	1 U	2 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	14	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	2 U	500	2 U	2 U	4 U	2.4	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	2.6	1 U	1 U	**220**	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	1 U	500	1 U	1 U	2 U	2.4	0.77 J
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**52**	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	37	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	0.95 J	1 U	1 U	17	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	2.5	1 U	1 U	110	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	2.1	1 U	1 U	2 U	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	**8.1**	1 U	1 U	2 U	1 U	1.2
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	**140**	1 U	1 U	2 U	1.2	1 U
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	54	3 U	3 U

Notes:

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µg/l - micrograms per liter

TABLE 17
Vapor Intrusion Screening Data - Site 78 South
Site 78 Technical Memorandum

Station ID	**NCGWQS**	**GWSL**	IR78-GW57	IR78-GW59	IR78-GW60	IR78-GW63	IR78-GW64	IR78-GW66	IR78-GW68	IR78-GW73	IR78-GW76	IR78-GW107	IR78-RW09R
Sample ID	**(Feb, 2012)**	**(Jan, 2014)**	IR78-GW57-11C	IR78-GW59-11C	IR78-GW60-11C	IR78-GW63-11C	IR78-GW64-11C	IR78-GW66-11C	IR78-GW68-11C	IR78-GW73-11C	IR78-GW76-11C	IR78-GW107-11C	IR78-RW09R-11C
Sample Date			09/15/11	09/14/11	09/15/11	09/14/11	09/14/11	09/14/11	09/14/11	09/12/11	09/12/11	09/15/11	09/14/11
Chemical Name													
Volatile Organic Compounds (µg/l)													
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	3.2	1 U	1 U	1 U	2.3	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	7	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	3.1	1.8 J	17	9.6	1.6 J	2 U	2 U	350	68	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.59 J	1 U
cis-1,2-Dichloroethene	70	N/A	0.57 J	3.1	1.8 J	16	9.6	1.6	1.1	1 U	400	67	1 U
Ethylbenzene	600	152	1 U	1 U	**1,900**	1 U	1 U	1 U	1 U	1 U	**200**	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	160 J	1 U	1 U	1 U	1 U	3.9	76	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	**6,000**	2 U	2 U	2 U	2 U	2 U	**1,600**	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	**2,100**	1 U	1 U	1 U	1 U	1 U	**480**	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1.1	1 U	1 U
Toluene	600	16,100	1 U	1 U	210	1 U	1 U	1 U	1 U	1 U	11	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	**420**	2	1.4	1 U	1 U	1 U	**420**	**26**	1 U
Vinyl chloride	0.03	25	0.78 J	1.4	1 U	1 U	1 U	**41**	1 U	1 U	0.93 J	3.4	1 U
Xylene, total	500	414	3 U	3 U	**8,200**	3 U	3 U	3 U	3 U	3 U	**2,100**	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS the more conservative MCL

Bold text indicates exceedance of GWSL

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more conservative.

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U - Not detected

µg/l - micrograms per liter

Figures

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Legend

Highways

Land Use Control Boundaries

Aquifer Use Control Boundary

Intrusive Activities Control Boundary (Groundwater)

Non-Industrial Use Control Boundary

Installation Boundary

N

0 7,500 15,000 30,000 Feet

1 inch = 15,000 feet

Figure 1
Base Location Map
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

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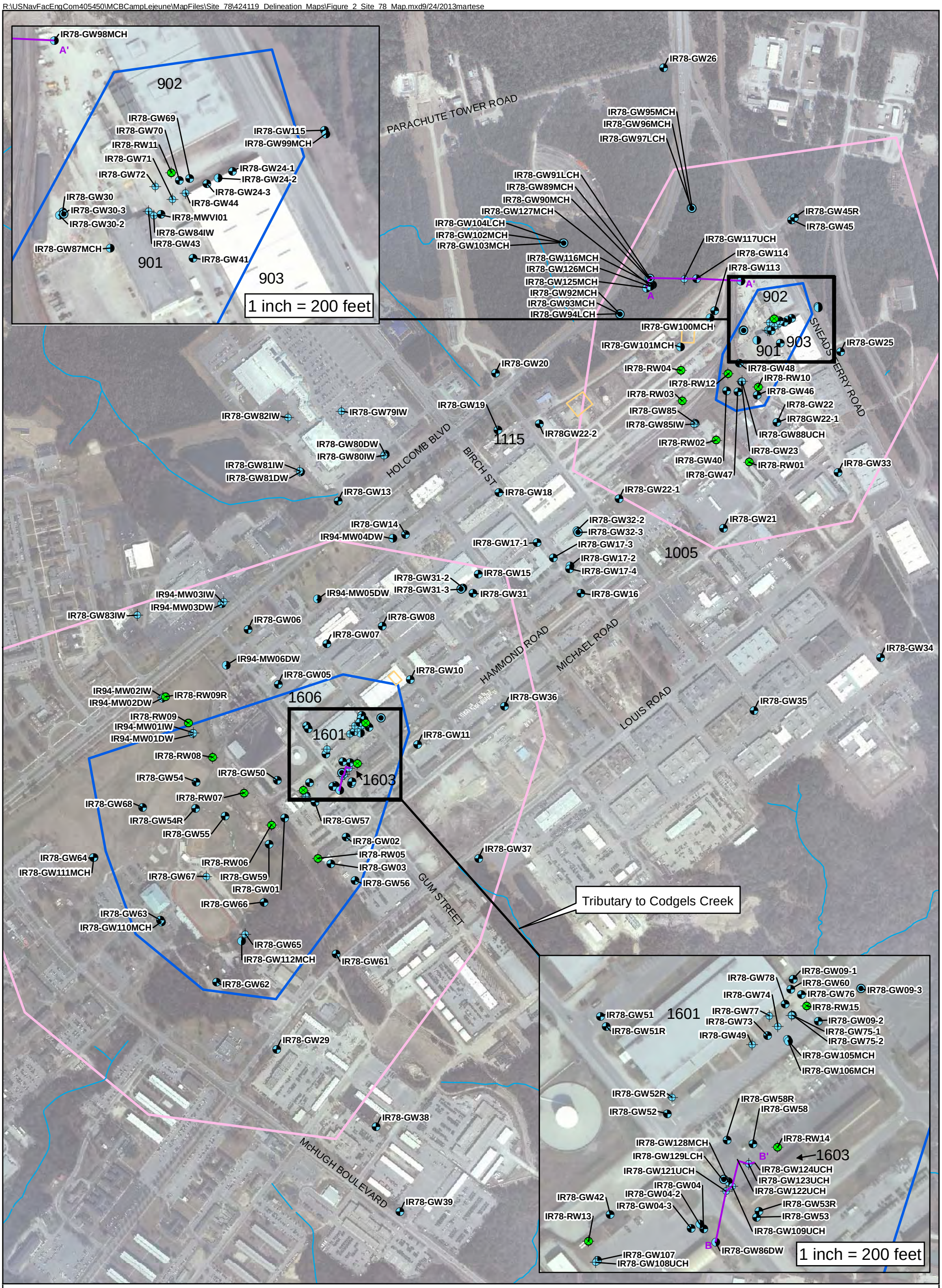


Legend

Monitoring Wells

- Surficial Aquifer
- Upper Castle Hayne Aquifer
- Middle Castle Hayne Aquifer
- Lower Castle Hayne Aquifer
- Recovery Wells
- Aquifer Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Non-Industrial Use Control Boundary
- Cross Section Location
- Surface Water

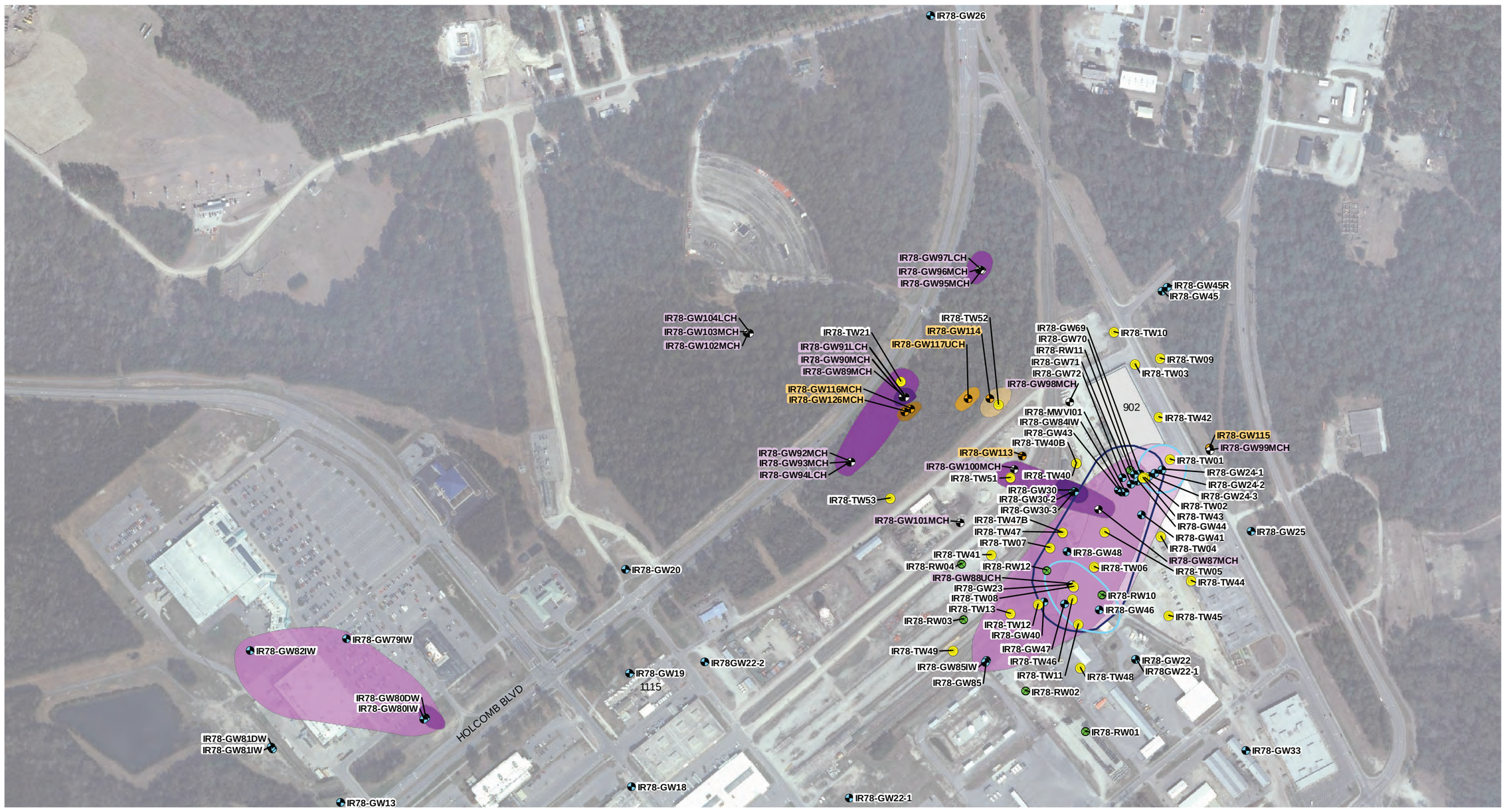
N

0 350 700 1,400 Feet

1 inch = 700 feet

Figure 2
Site Map
Site 78 Technical Memorandum
MCIEAST - MCB CAMLEJ
North Carolina

CH2MHILL



Legend

- DPT Sample Location (Rhea, 2011)
- Monitoring Well - Existing
- Monitoring Well - Confirmatory Groundwater Investigation
- Monitoring Well - Additional GW Investigation
- Recovery Well

Groundwater VOC Plume Area (2010)

- Shallow VOC Plume - LTM
- Deep VOC Plume - LTM

Confirmatory Groundwater Investigation* (September 2011)

- Surficial Aquifer
- Upper Castle Hayne Aquifer
- Middle Castle Hayne Aquifer
- Lower Castle Hayne Aquifer

*Plumes interpolated based on exceedance of NCGWQS/MCL.

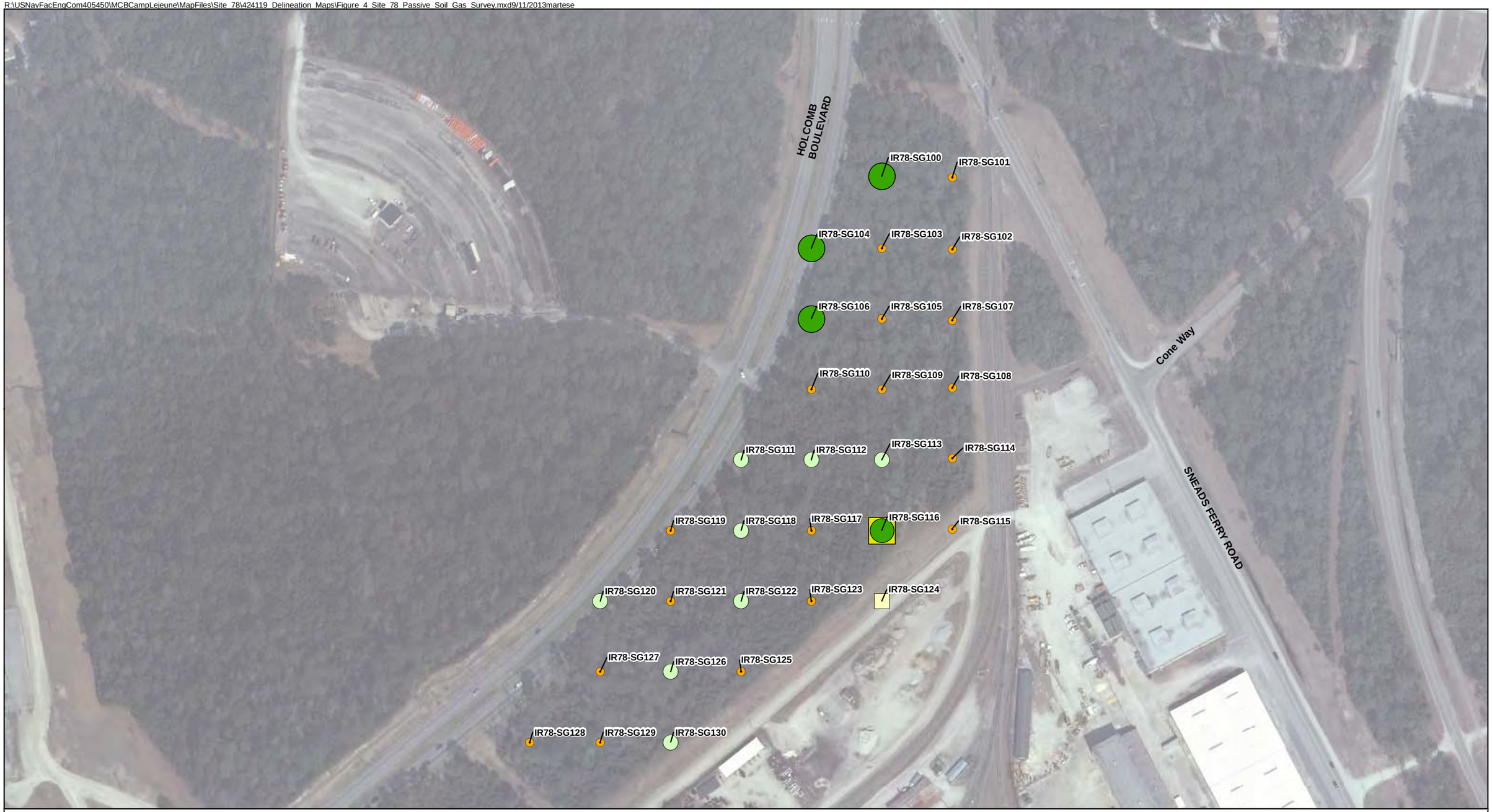
Additional Groundwater Investigation* (April 2012)

- Surficial Aquifer
- Upper Castle Hayne Aquifer
- Middle Castle Hayne Aquifer

FIGURE 3
Summary of Investigations
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

R:\USNavFacEngCom405450\MCBCampLejeune\MapFiles\Site_78\424119_Delineation_Maps\Figure_4_Site_78_Passive_Soil_Gas_Survey.mxd9/11/2013martese



Legend

- Non-Detect Passive Soil Gas Sampling Locations
- 0 - 100 ng - Toluene
- 100 - 1,000 ng - Toluene
- 0 - 100 ng - Chlorinated Volatile Organic Compound
- 1,000 - 10,000 ng - Chlorinated Volatile Organic Compound

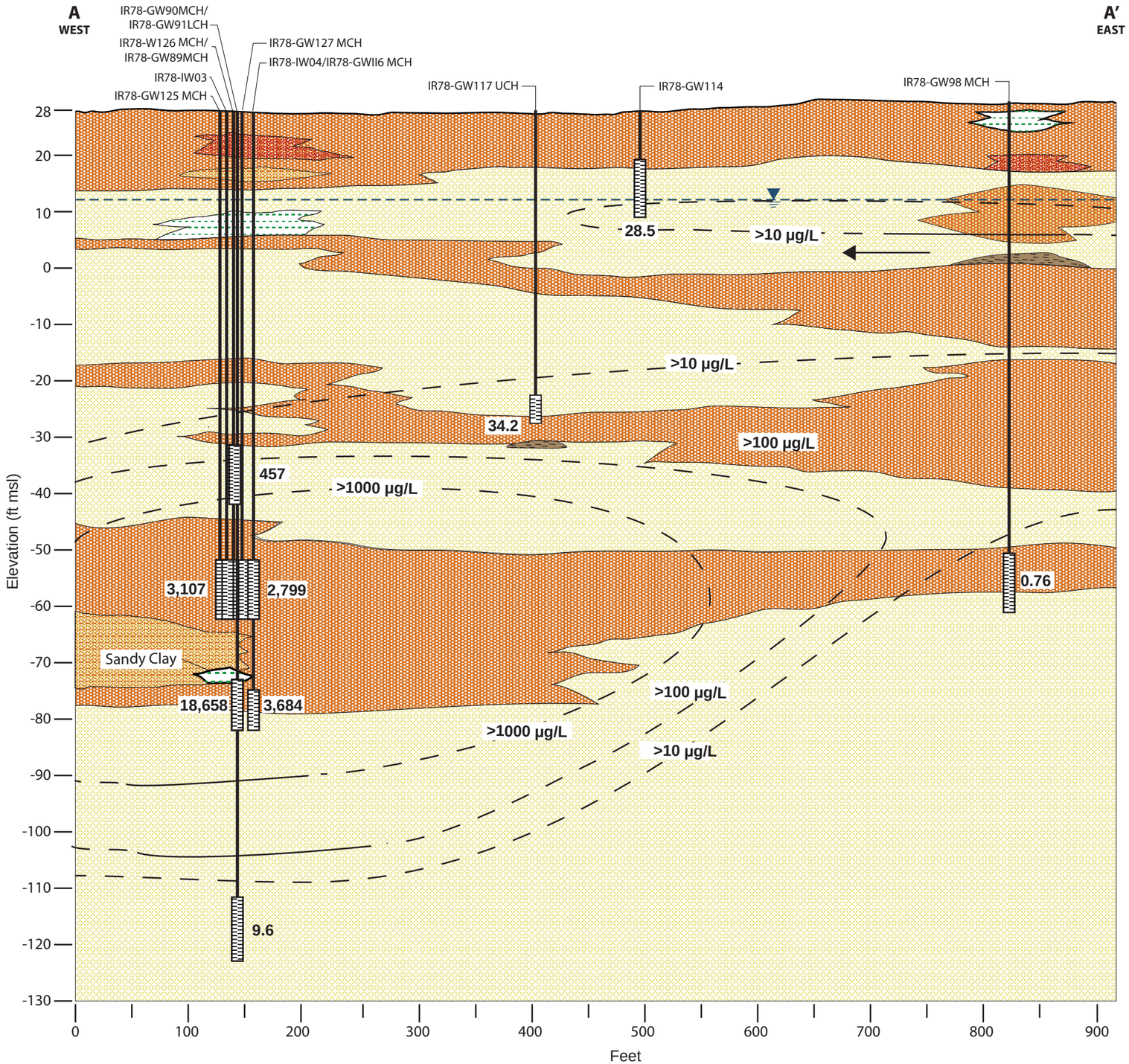
N

0 100 200 400 Feet

1 inch = 200 feet

Figure 4
Passive Soil Gas Survey
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL



LEGEND

- Sand
- Silty Sand
- Sandy Silt
- Sandy Clay/Silty Sandy Clay
- Clayey Sand
- Well bore with screened interval
- Approximate Water Table
- Groundwater Flow
- Isoconcentration contour, dashed where inferred

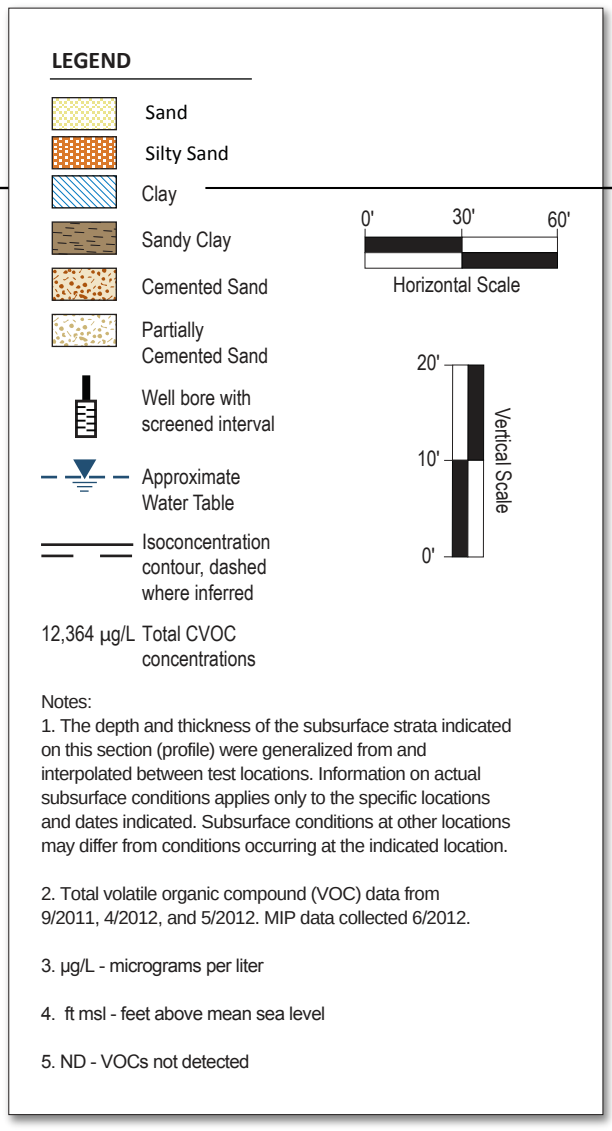
0' 50' 100'
Horizontal Scale

20'
10'
0'
Vertical Scale

Notes:

1. The depth and thickness of the subsurface strata indicated on this section (profile) were generalized from and interpolated between test locations. Information on actual subsurface conditions applies only to the specific locations and dates indicated. Subsurface conditions at other locations may differ from conditions occurring at the indicated location.
2. Total volatile organic compound (VOC) data from 9/2011, 4/2012, and 5/2012.
3. µg/L - micrograms per liter
4. NS - Not sampled
5. ft msl - feet above mean sea level

Figure 5
Site 78 N Cross-Section A-A'
Site 78 North
MCIEAST-MCB CAMLEJ
North Carolina



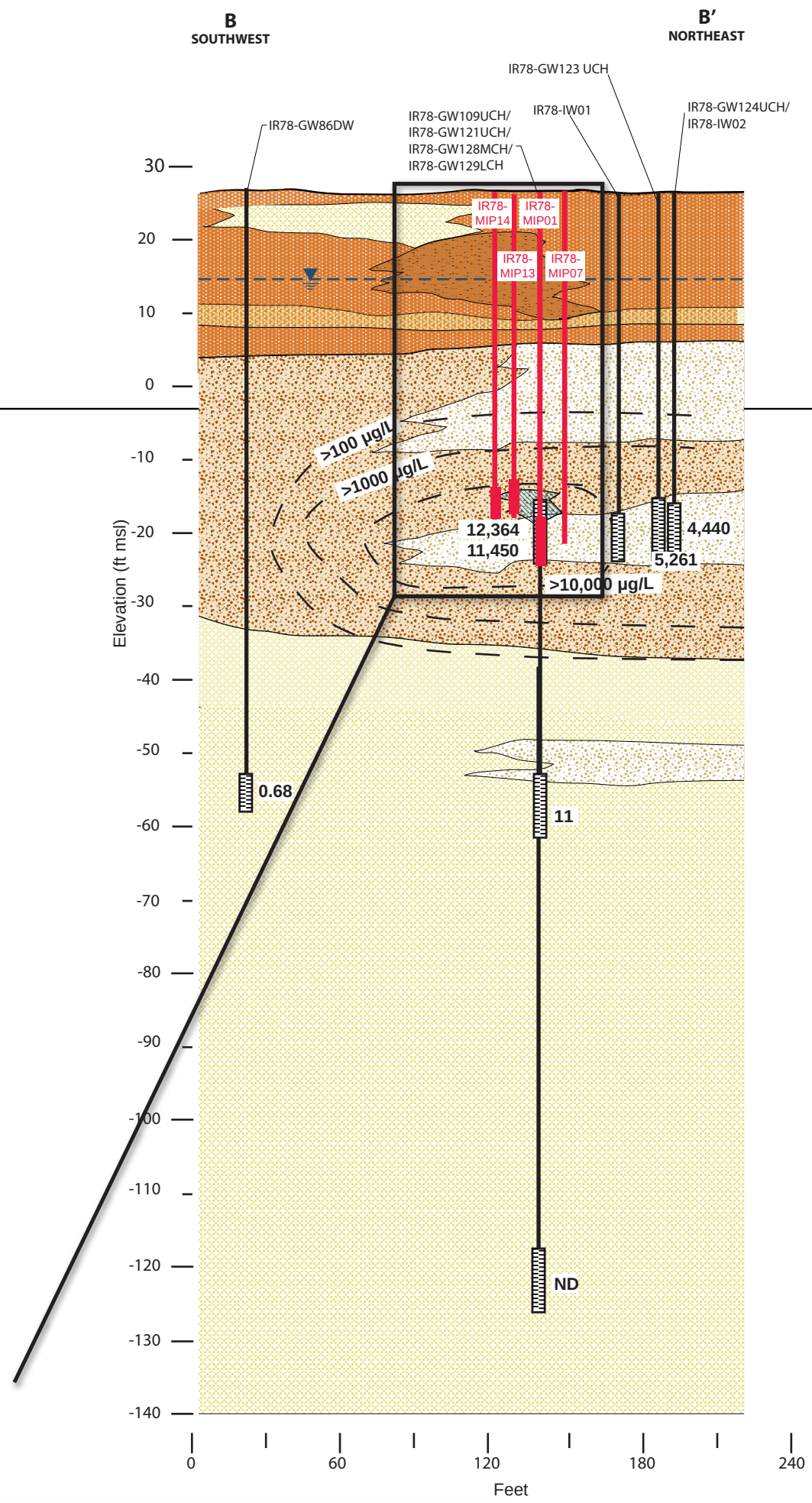


Figure 6
Cross-Section B-B'
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

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Legend

- Surficial Aquifer
- Upper Castle Hayne Aquifer
- Middle Castle Hayne Aquifer
- Lower Castle Hayne Aquifer
- No ECD Response
- ECD Response 4.5 x 10^5µV
- ECD Response 1.1 x 10^6µV

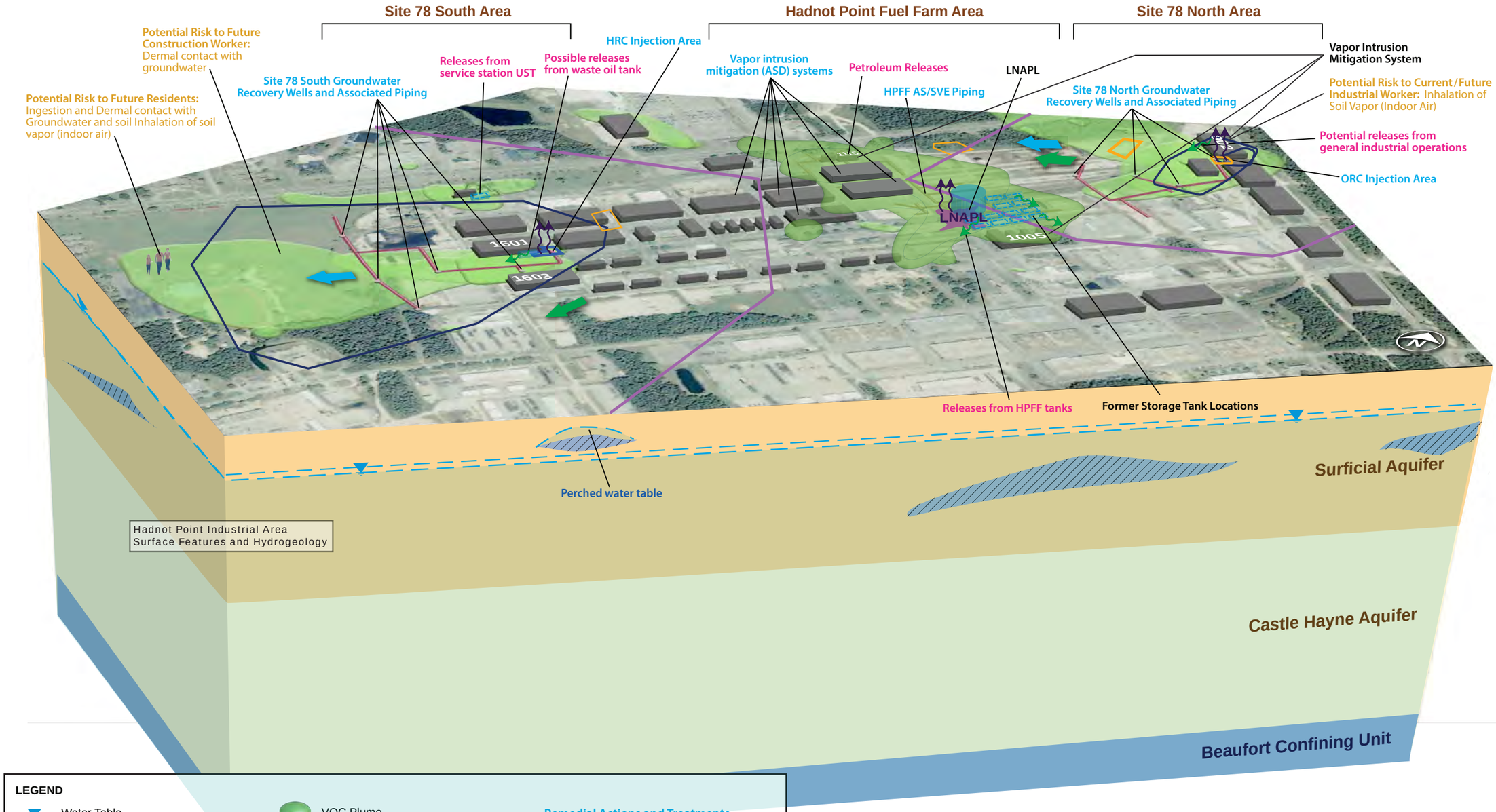
N

0 20 40 80 Feet

1 inch = 40 feet

Figure 7
MIP Results
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL



LEGEND

- Water Table
- Sand with Interbedded Silts and Clays
- Sands, Interbedded Limestone, and Partially Cemented Sand

Groundwater Flow Direction

- Surficial Aquifer
- Castle Hayne Aquifer

- VOC Plume
- Clay
- Potential Vapor Intrusion Pathway
- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary

- Remedial Actions and Treatments
- Potential Releases/Sources
- Potential Risks and Receptors

ORC – Oxygen Release Compound
HRC – Hydrogen Release Compound
HPFF – Hadnot Point Fuel Farm
AS/SVE – Air Sparge/Soil Vapor Extraction
UST – Underground Storage Tank
ASD – Active Sub-slab Depressurization

FIGURE 8
Conceptual Site Model
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

ES070313105727GNV 2014_UFOSAP_LTM_Fig8_Site78_CSM_v05.ai 09.24.2013 JM

CH2MHILL

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IR78-GW26
25.35
IR78-RW11
18.53
IR78-GW45R
19.13
IR78-MWVI01
NA
IR78-GW24-1
25.12
IR78-GW114
IR78-GW113
IR78-GW48
20.49
IR78-GW115
IR78-RW12
18.83
IR78-GW20
16.42
IR78-RW04
NM
IR78-GW25
22.98
IR78-GW23
20.43
IR78-GW40
20.44
IR78-GW19
23.64
IR78-RW03
NM
IR78-RW10
19.14
IR78-GW85
21.98
IR78-GW22
24.73
IR78-GW46
20.31
IR78-GW33
NM
IR78-RW01
NM
IR78-GW13
13.98
IR78-GW22-1
19.14
IR78-GW14
18.98
IR78-GW07
NM
IR78-RW02
NM
IR78-GW09-1
16.98
IR78-GW21
23.71
IR78-GW76
13.75
IR78-GW17-1
18.27
IR78-GW60
13.54
IR78-GW31
NM
IR78-GW16
19.85
IR78-GW73
13.95
IR78-GW34
25.72
IR78-RW09R
9.93
IR78-GW08
15.41
IR78-GW05
16.95
IR78-GW12
18.83
IR78-GW10
15.99
IR78-GW51R
10.44
IR78-RW15
-1.80
IR78-GW35
18.39
IR78-GW36
17.18
IR78-RW08
NM
IR78-GW42
10.46
IR78-GW11
15.42
IR78-RW07
11.27
IR78-GW68
10.20
IR78-GW54R
9.78
IR78-GW55
DRY
IR78-GW64
9.19
IR78-GW50
11.24
IR78-GW37
12.12
IR78-GW02
25.44
IR78-RW06
NM
IR78-GW66
10.01
IR78-GW56
NM
IR78-GW63
9.29
IR78-GW03
25.72
IR78-RW13
NM
IR78-GW01
17.98
IR78-GW107
10.07
IR78-RW05
11.01
IR78-GW59
10.59
IR78-GW57
10.92
IR78-GW62
NM
IR78-GW29
7.8
IR78-GW39
4.39
IR78-GW58R
15.76
IR78-RW14
6.74
IR78-GW53R
10.40
IR78-GW04-1
11.42
BIRCH STREET
LUCY BREWER AVENUE
MOLLY PITCHER
POST LANE
CENTER ROAD
EAST ROAD
CEDAR STREET
BIRCH STREET
HOLCOMB BOULEVARD
LOUIS ROAD
FRANKLIN STREET
O STREET
DUNCAN STREET
SNEADS FERRY ROAD
H STREET
McHUGH BOULEVARD
GUM STREET
B STREET
L STREET
M STREET
CONNECTOR ROAD
DUNCAN STREET
N STREET
O STREET
1 inch = 200 feet

Legend

- Recovery Wells
- Monitoring Wells
- Area of perched groundwater
- Groundwater depression
- Estimated direction of groundwater flow
- Potentiometric surface contour (dashed where inferred)

Notes:
- Potentiometric surface contours have been interpolated between monitoring well locations. Actual conditions may differ from those shown here.
- Groundwater elevation data measured on September 17 and 18, 2011
- 7.8 -Groundwater elevations (feet above mean sea level)
- IR78-GW54R and IR78-GW58R were not used in contouring
- NM - not measured
- NA - not avaliable

Figure 9
Potentiometric Surface Map
Surficial Aquifer
Site 78 Technical Memorandum
MCIEAST - MCB CAMLEJ
North Carolina

N

0 375 750
Feet

1 inch = 750 feet

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Legend

- Monitoring Wells
- Recovery Well
- Estimated direction of groundwater flow
- Potentiometric surface contour (dashed where inferred)

Notes:

- Potentiometric surface contours have been interpolated between monitoring well locations. Actual conditions may differ from those shown here.
- Groundwater elevation data measured on September 17 and 18, 2011
- IR78-GW47 was not used for contouring
- 9.59 - Groundwater elevations (feet above mean sea level)
- NM - not measured

N

0 375 750 1,500 Feet

1 inch = 750 feet

Figure 10
Potentiometric Surface Map
Upper Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST - MCB CAMLEJ
North Carolina

CH2MHILL

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Legend

- Monitoring Wells
- Estimated direction of groundwater flow
- Potentiometric surface contour (dashed where inferred)

Notes:
- Potentiometric surface contours have been interpolated between monitoring well locations. Actual conditions may differ from those shown here.
- Groundwater elevations measured on September 17 and 18, 2011
- 8.32 - Groundwater elevations (feet above mean sea level)
- NM - not measured
- Wells used to construct this potentiometric map were screened from 70-110 feet below ground surface

N

0 375 750 1,500 Feet

1 inch = 750 feet

Figure 11
Potentiometric Surface Map
Middle Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST - MCB CAMLEJ
North Carolina

CH2MHILL

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Legend

- Monitoring Wells
- Estimated direction of groundwater flow
- Potentiometric surface contour (dashed where inferred)

Notes:
- Potentiometric surface contours have been interpolated between monitoring well locations. Actual conditions may differ from those shown here.
- Groundwater elevation data measured on September 17 and 18, 2011
- 15.70 - Groundwater elevations (feet above mean sea level)
- NM - not measured

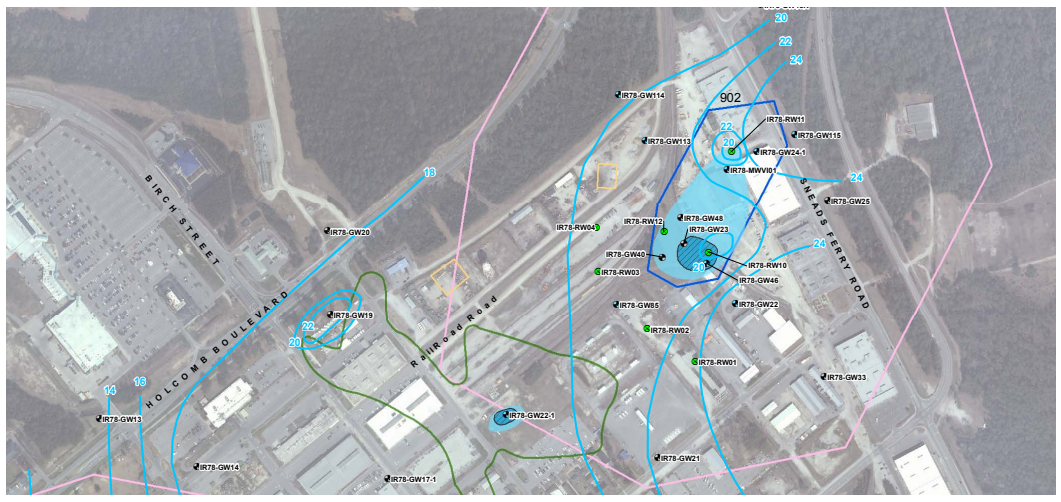
N

0 375 750 1,500 Feet

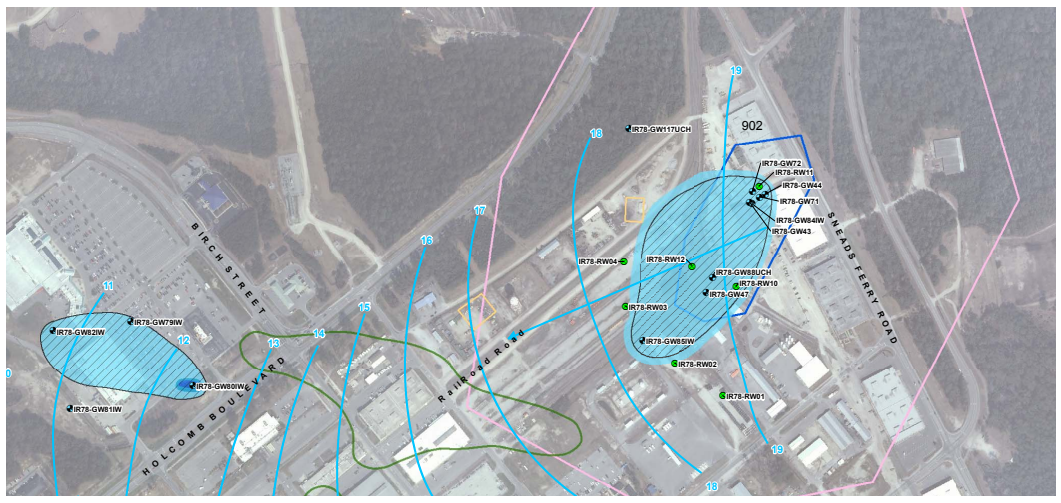
1 inch = 750 feet

Figure 12
Potentiometric Surface Map
Lower Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST - MCB CAMLEJ
North Carolina

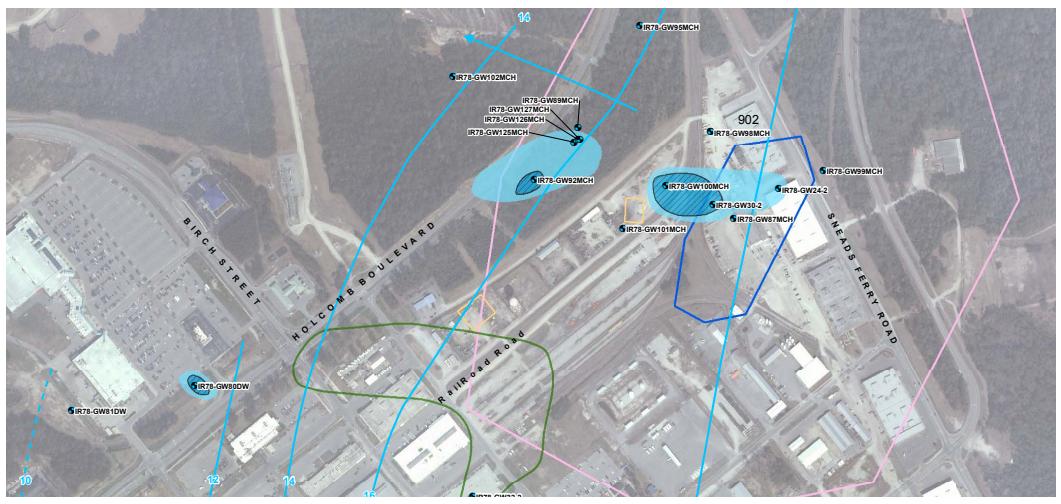
CH2MHILL



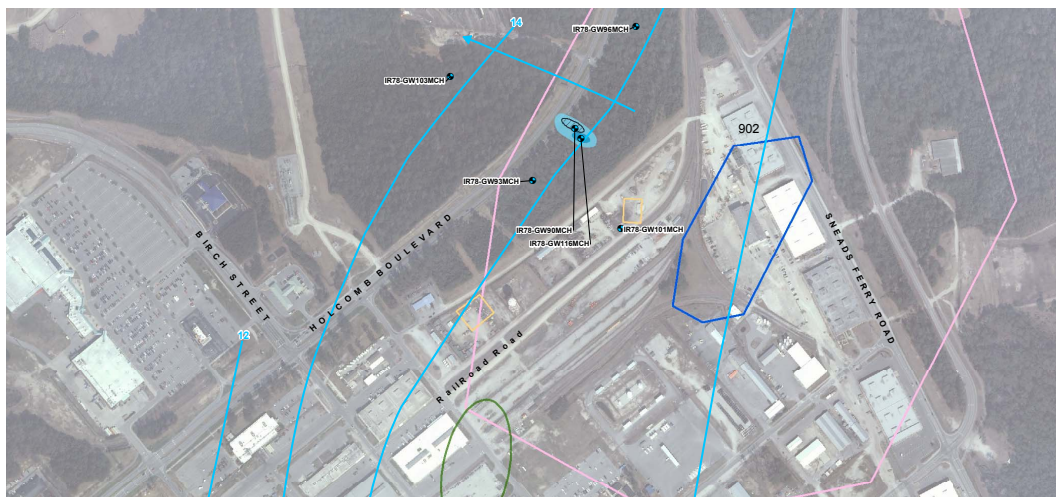
Surficial Aquifer 0'-30' bgs



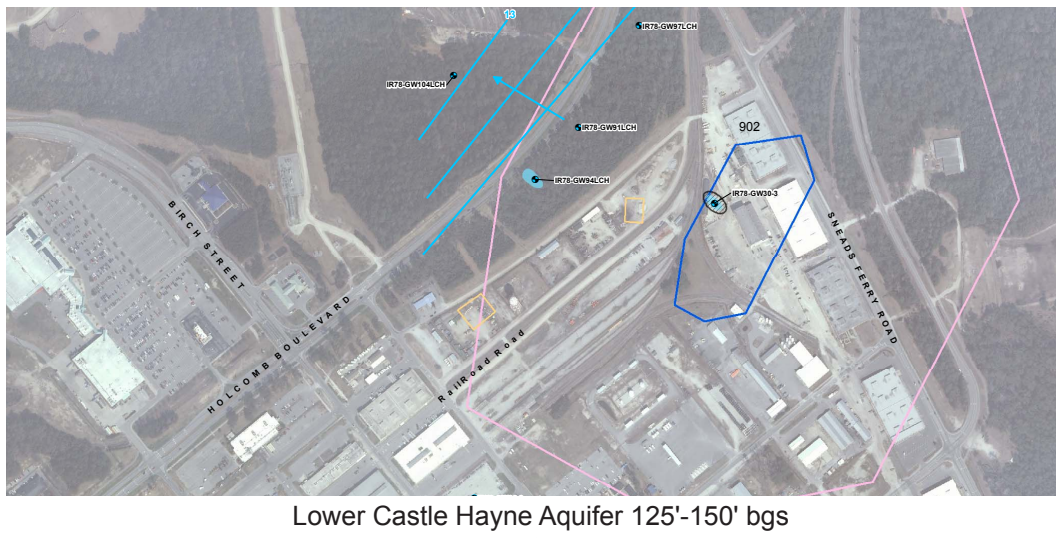
Upper Castle Hayne Aquifer 30'-60' bgs



Middle Castle Hayne Aquifer 70'-90' bgs



Middle Castle Hayne Aquifer 90'-125' bgs



Lower Castle Hayne Aquifer 125'-150' bgs

Legend

- Monitoring Well
- Monitoring Well not in LTM
- Recovery Well
- Estimated direction of groundwater flow
- Potentiometric surface contour

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Non-Industrial Use Control Boundary

Note: Detections of BTEX below NCGWQS are shown to further refine the conceptual site model

N

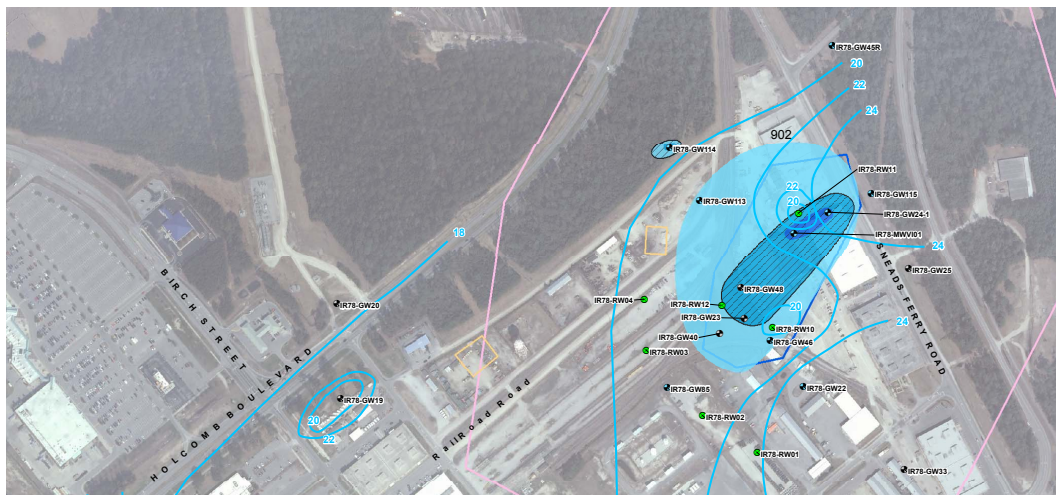
0 200 400 800 Feet

BTEX Plume Concentrations

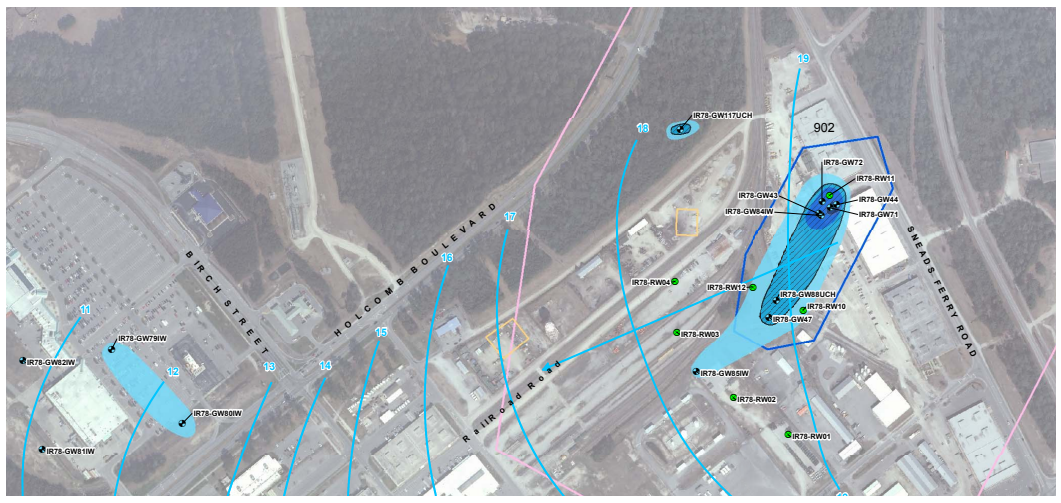
- 0-10 µg/L
- 10-100 µg/L
- 100-1,000 µg/L
- Exceeds NCGWQS
- HPFF BTEX Plume (Shaw, 2009)

FIGURE 13
BTEX Plume Maps – North
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

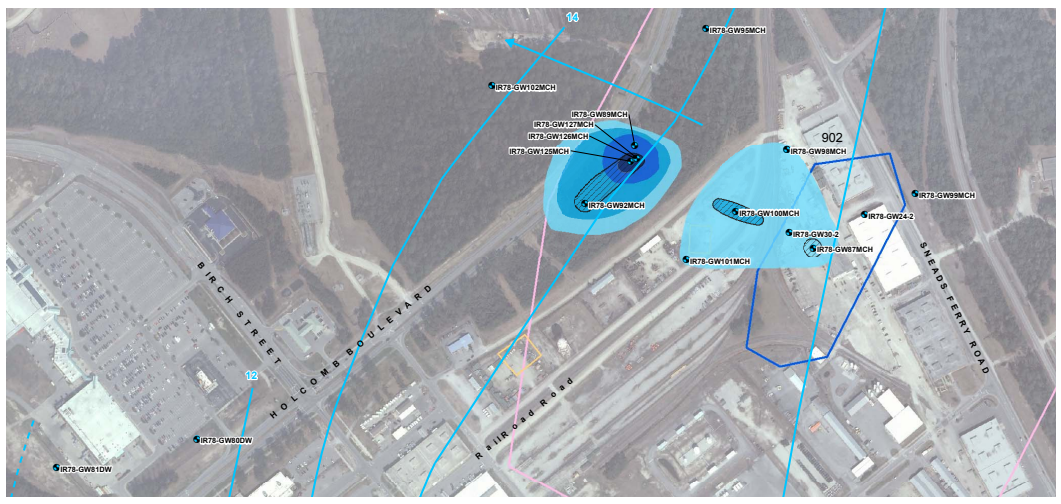
CH2MHILL



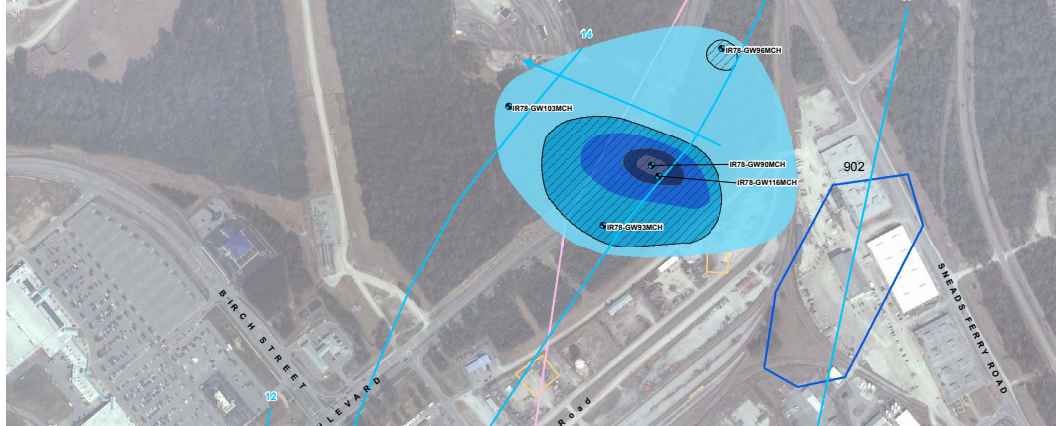
Surficial Aquifer 0'-30' bgs



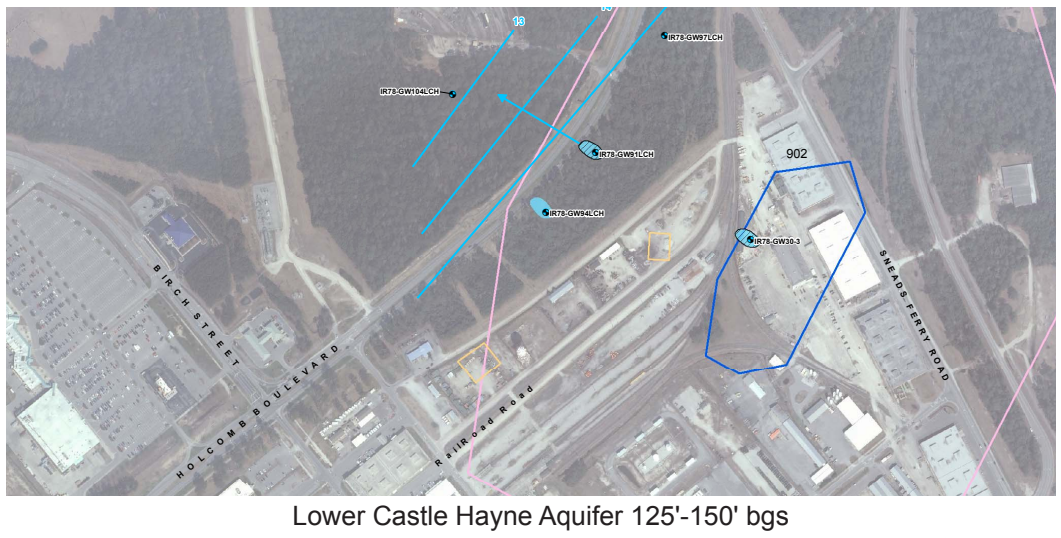
Upper Castle Hayne Aquifer 30'-60' bgs



Middle Castle Hayne Aquifer 70'-90' bgs



Middle Castle Hayne Aquifer 90'-125' bgs



Lower Castle Hayne Aquifer 125'-150' bgs

Legend

- Monitoring Well
- Monitoring Well not in LTM
- Recovery Well
- Estimated direction of groundwater flow
- Potentiometric surface contour

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Non-Industrial Use Control Boundary

Note: Detections of CVOCs below NCGWQS are shown to further refine the conceptual site model

CVOC Plume Concentrations

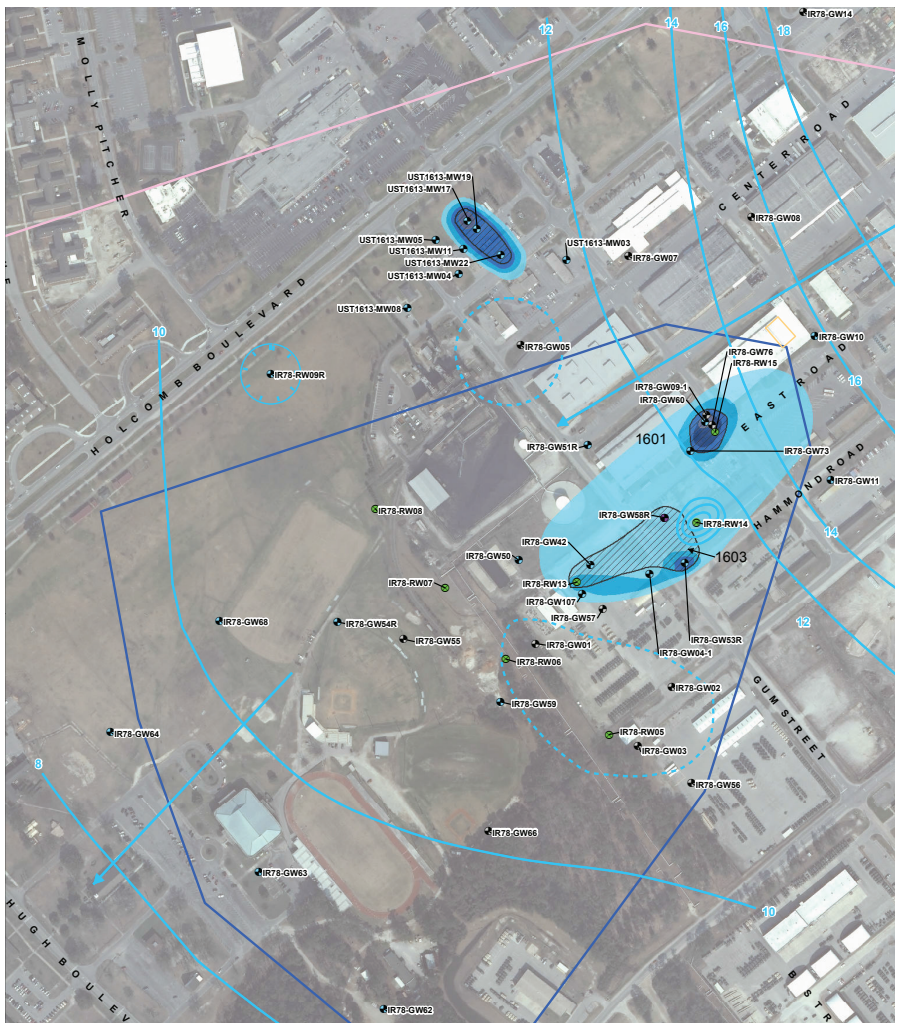
- 0-10 µg/L
- 10-100 µg/L
- 100-1,000 µg/L
- 1,000-10,000 µg/L
- >10,000 µg/L
- Exceeds NCGWQS

N

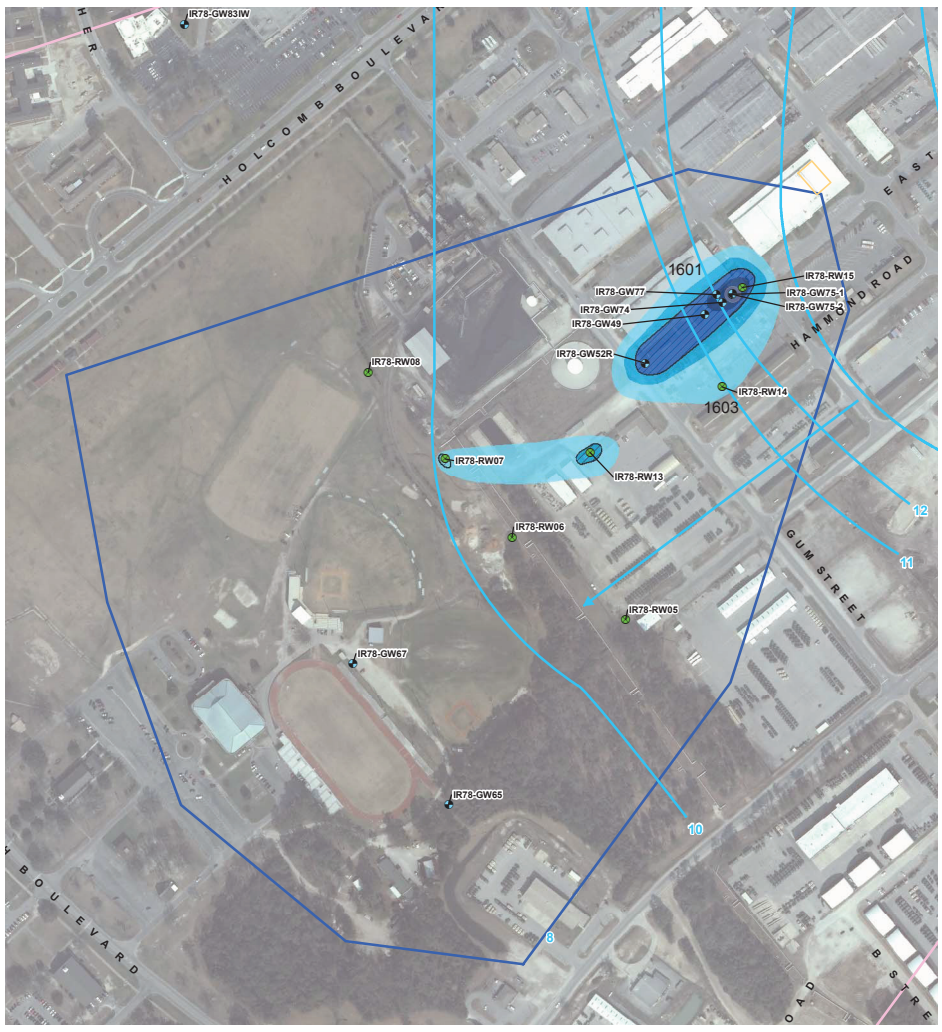
0 200 400 800 Feet

FIGURE 14
CVOC Plume Maps – North
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

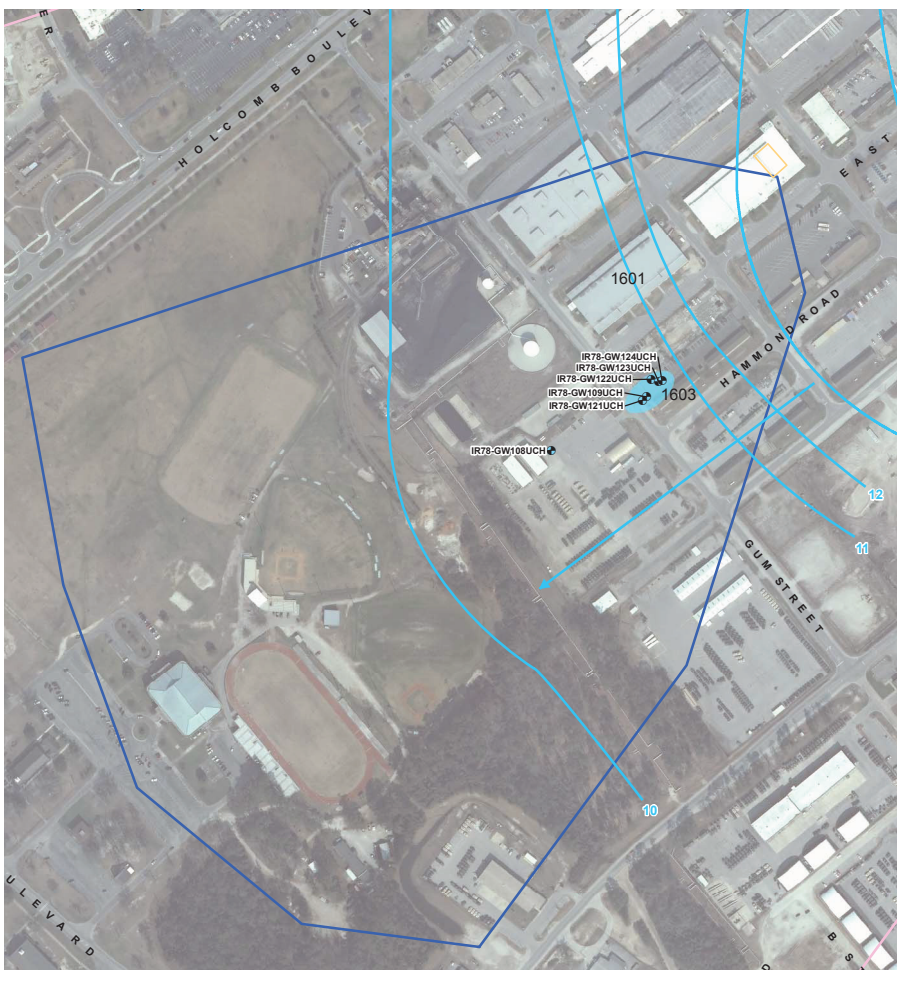
CH2MHILL



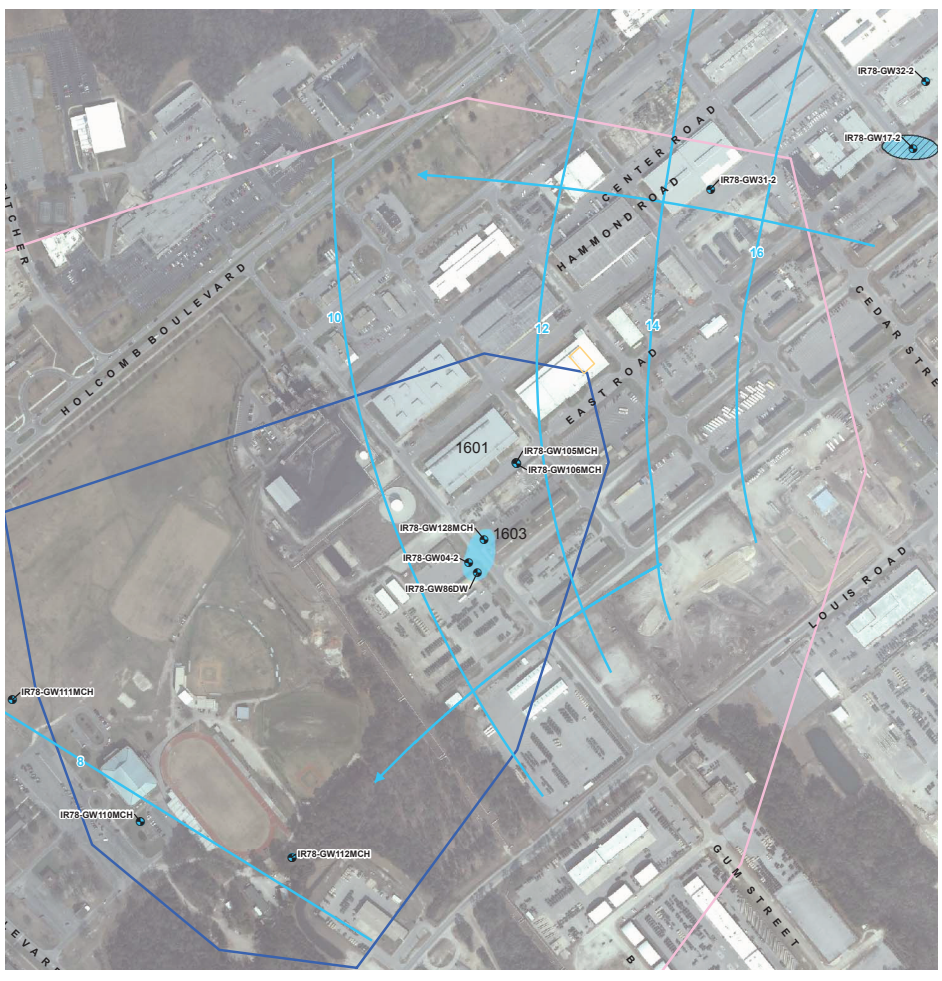
Surficial Aquifer 0'-30' bgs



Upper Castle Hayne Aquifer 30'-50' bgs



Upper Castle Hayne Aquifer 50'-60' bgs



Middle Castle Hayne Aquifer 60'-125' bgs

Legend

- Monitoring Well
- Monitoring Well - Not in LTM
- Monitoring Well Measured LNAPL
- Recovery Wells
- Estimated direction of groundwater flow
- Potentiometric surface contour
- Area of perched groundwater
- Groundwater depression

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

Note: Detections of BTEX below NCGWQS are shown to further refine the conceptual site model

N

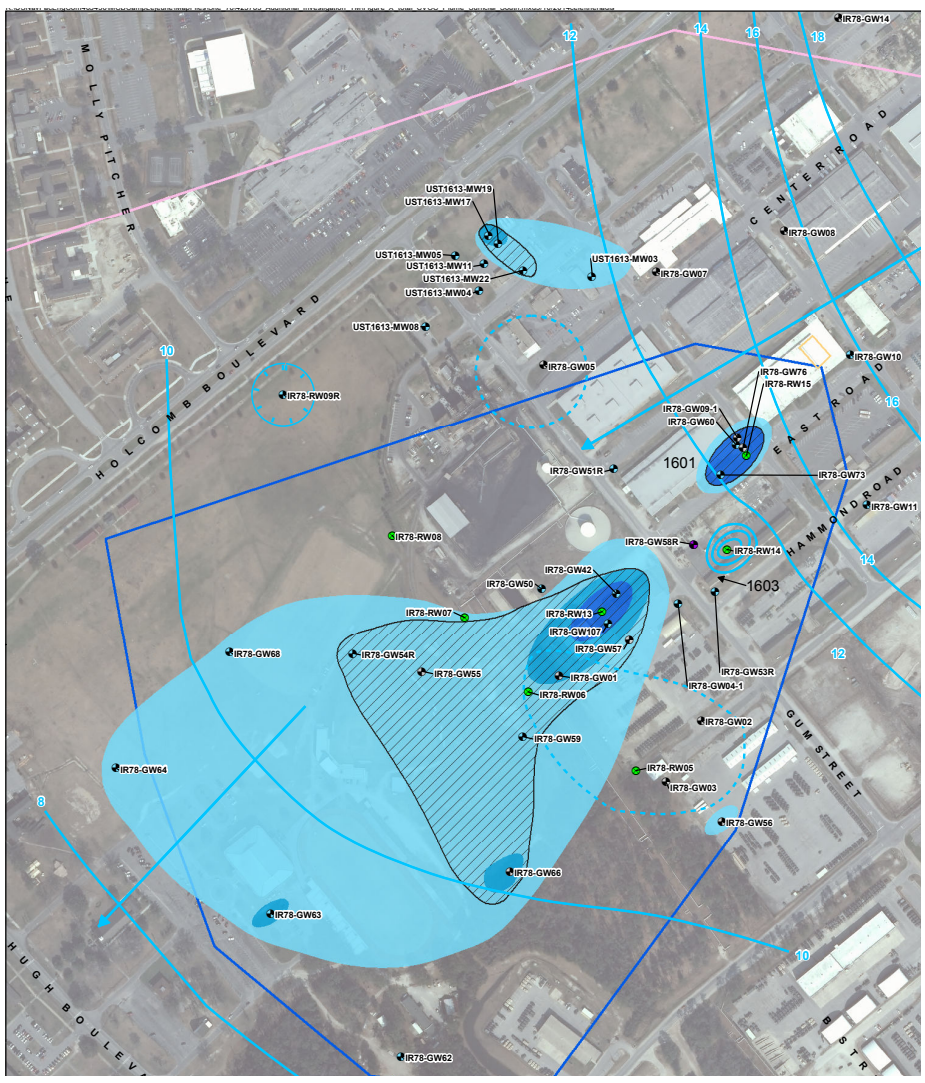
0 150 300 600 Feet

BTEX Concentration Plumes

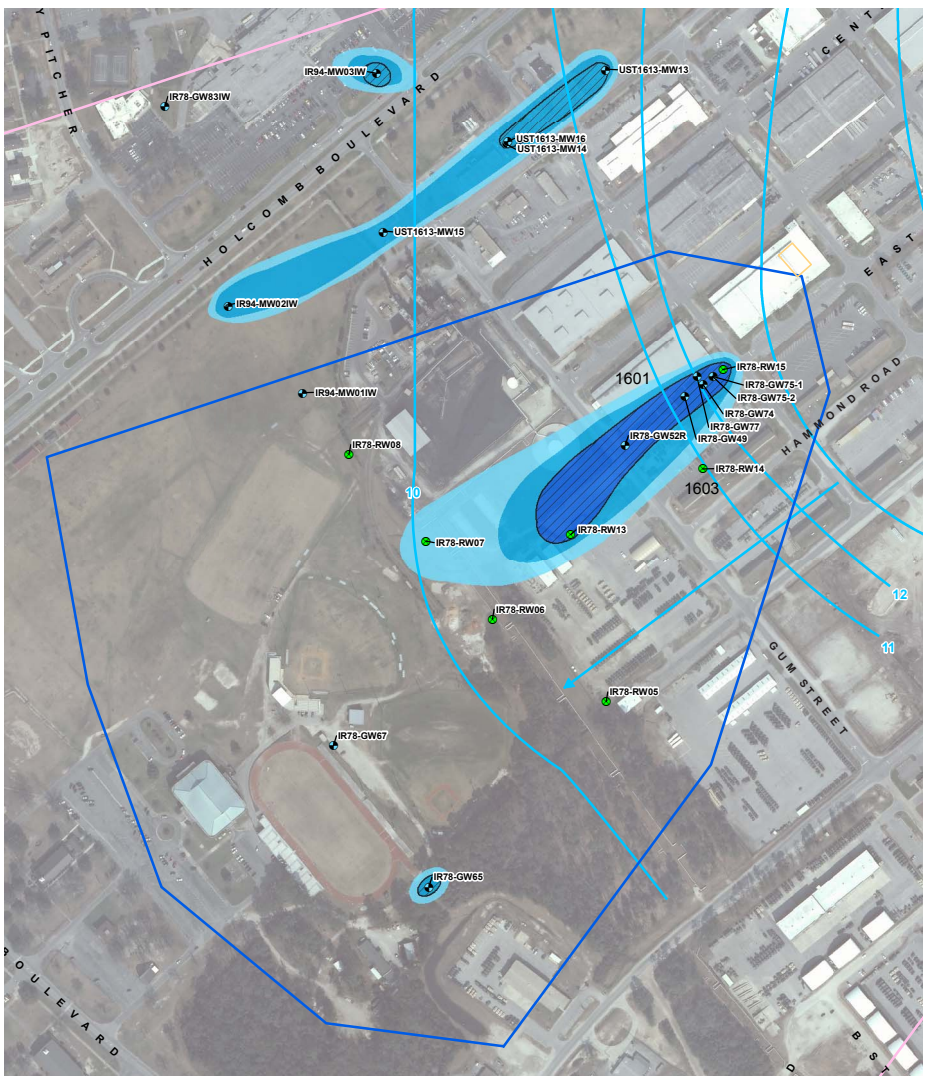
- 0-10 µg/L
- 10-100 µg/L
- 100-1,000 µg/L
- 1,000-10,000 µg/L
- >10,000 µg/L
- Exceeds NCGWQS

FIGURE 15
BTEX Plume Maps – South
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

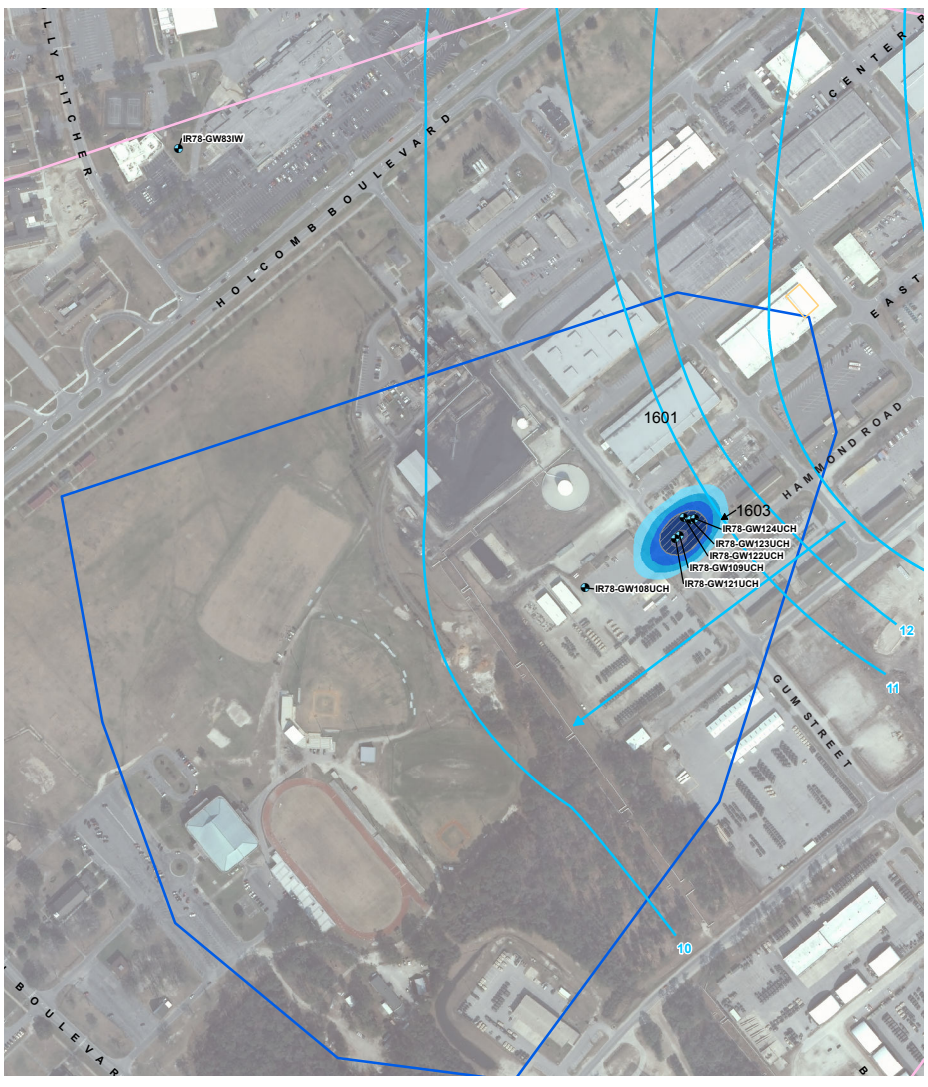
CH2MHILL



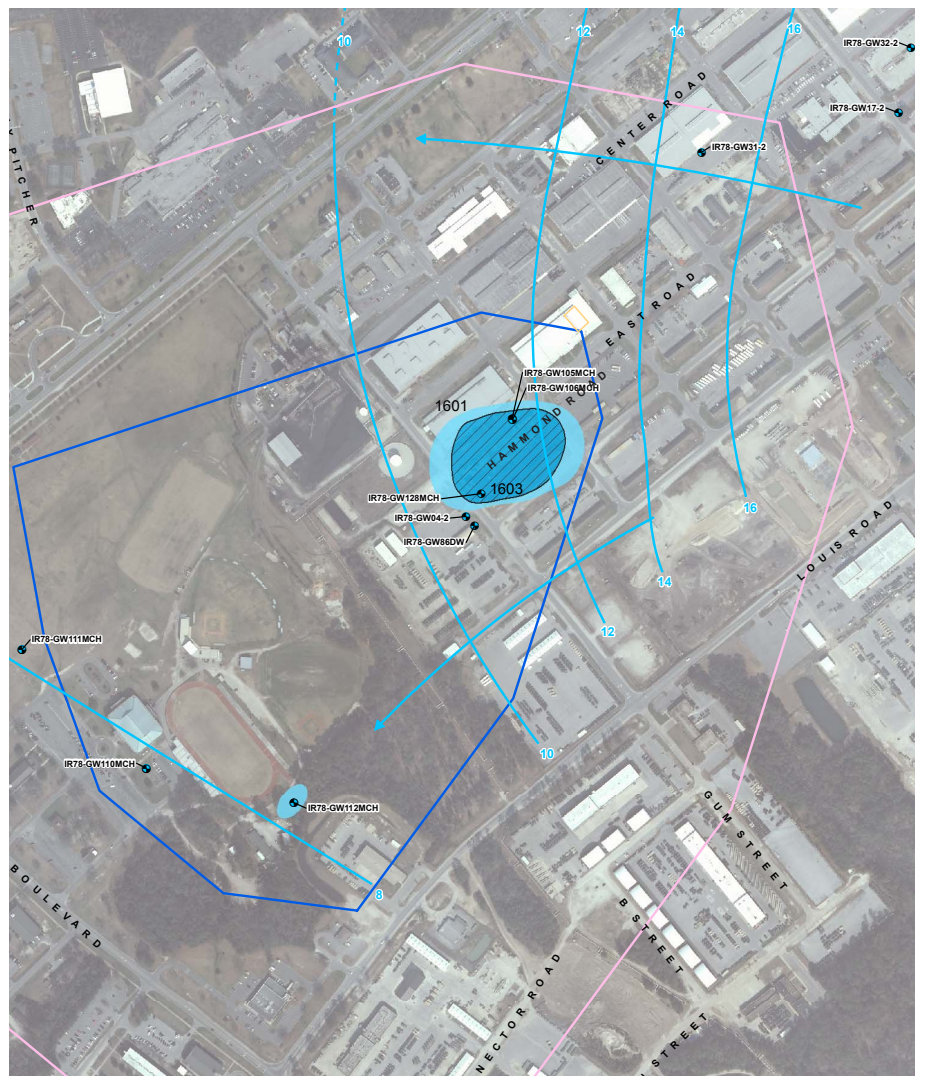
Surficial Aquifer 0'-30' bgs



Upper Castle Hayne Aquifer 30'-50' bgs



Upper Castle Hayne Aquifer 50'-60' bgs



Middle Castle Hayne Aquifer 60'-125' bgs

Legend

- Monitoring Well
- Monitoring Well - Not in LTM
- Monitoring Well Measured LNAPL
- Recovery Wells
- Estimated direction of groundwater flow
- Potentiometric surface contour
- Area of perched groundwater
- Groundwater depression

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

Note: Detections of CVOCs below NCGWQS are shown to further refine the conceptual site model

N

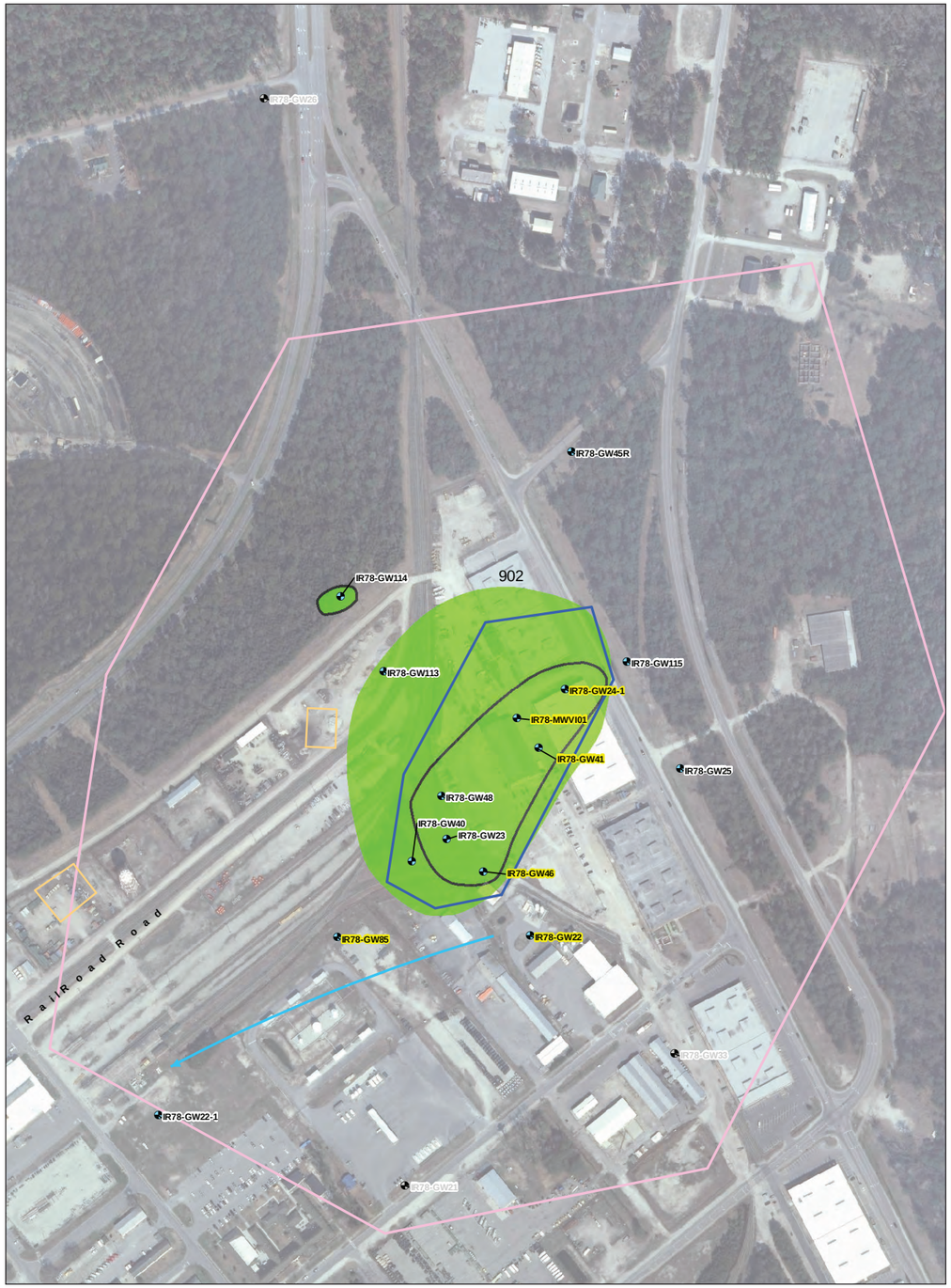
0 150 300 600 Feet

Total CVOC Concentration Plumes

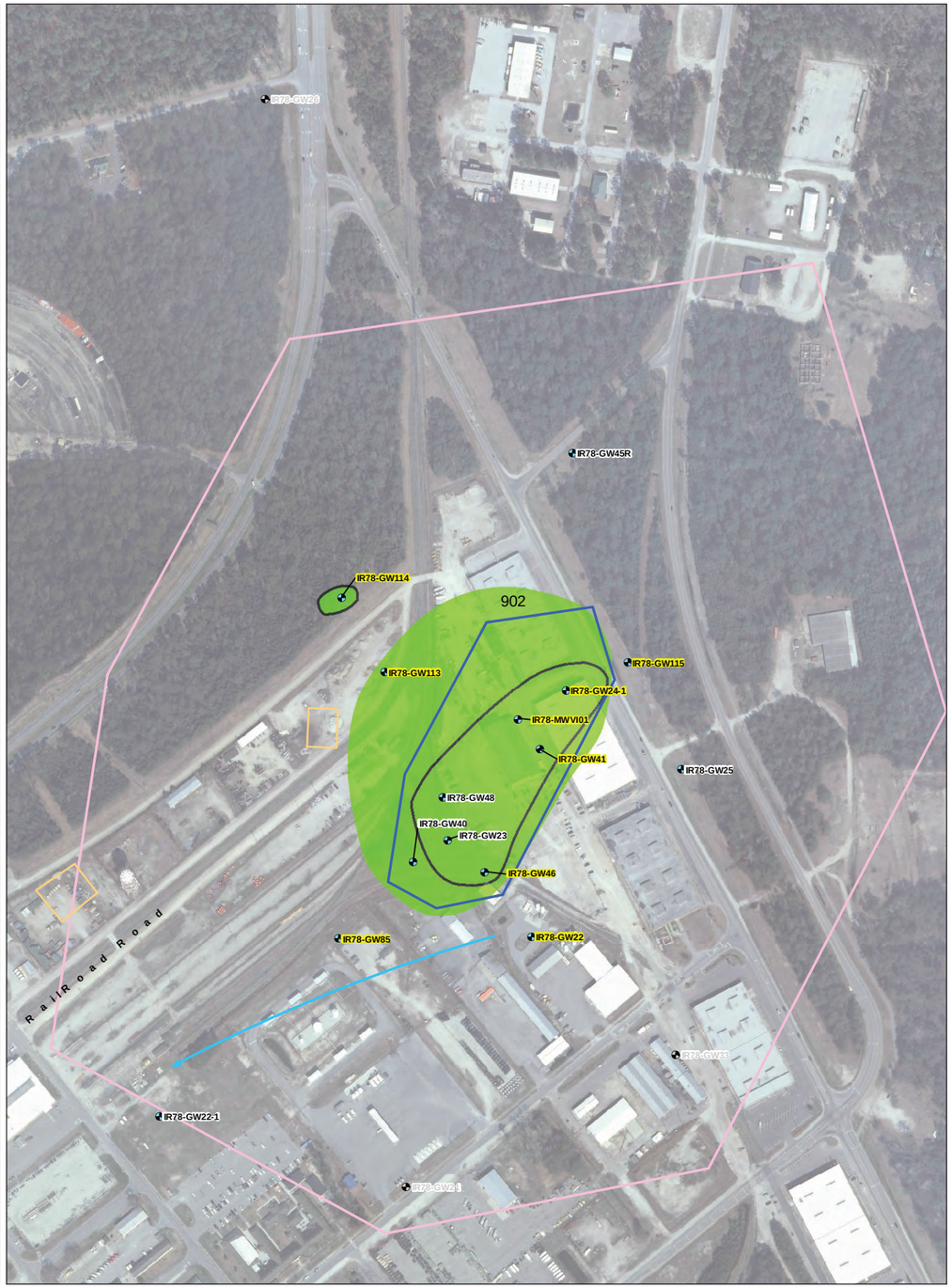
- 0-10 µg/L
- 10-100 µg/L
- 100-1,000 µg/L
- 1,000-10,000 µg/L
- >10,000 µg/L
- Exceeds NCGWQS

FIGURE 16
CVOC Plume Maps – South
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL



Current LTM Network (2013)



Proposed LTM Network (2014)

Legend

Monitoring Wells

- Surficial
- Surficial - not sampled

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Non-Industrial Use Control Boundary
- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

Note:
- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program
- The LTM network will be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs

N

0 150 300
Feet

FIGURE 17
Site 78 North - Current and Proposed LTM Wells - Surficial Aquifer
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

Current LTM Network (2013)

Proposed LTM Network (2014)

Legend

- Upper Castle Hayne
- Recovery Well
- Recovery Well - not sampled

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

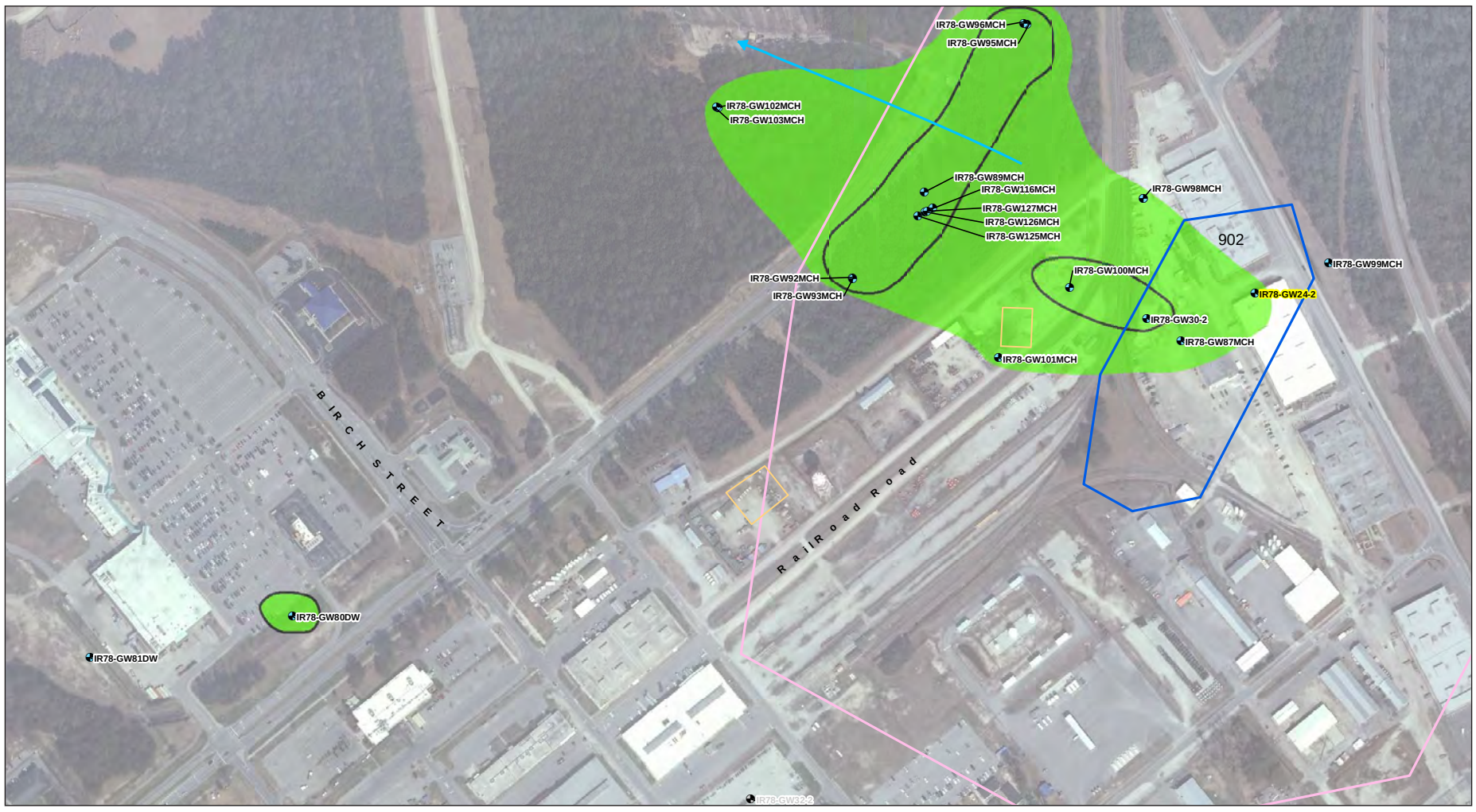
Note:
- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program
- The LTM network will be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs

N

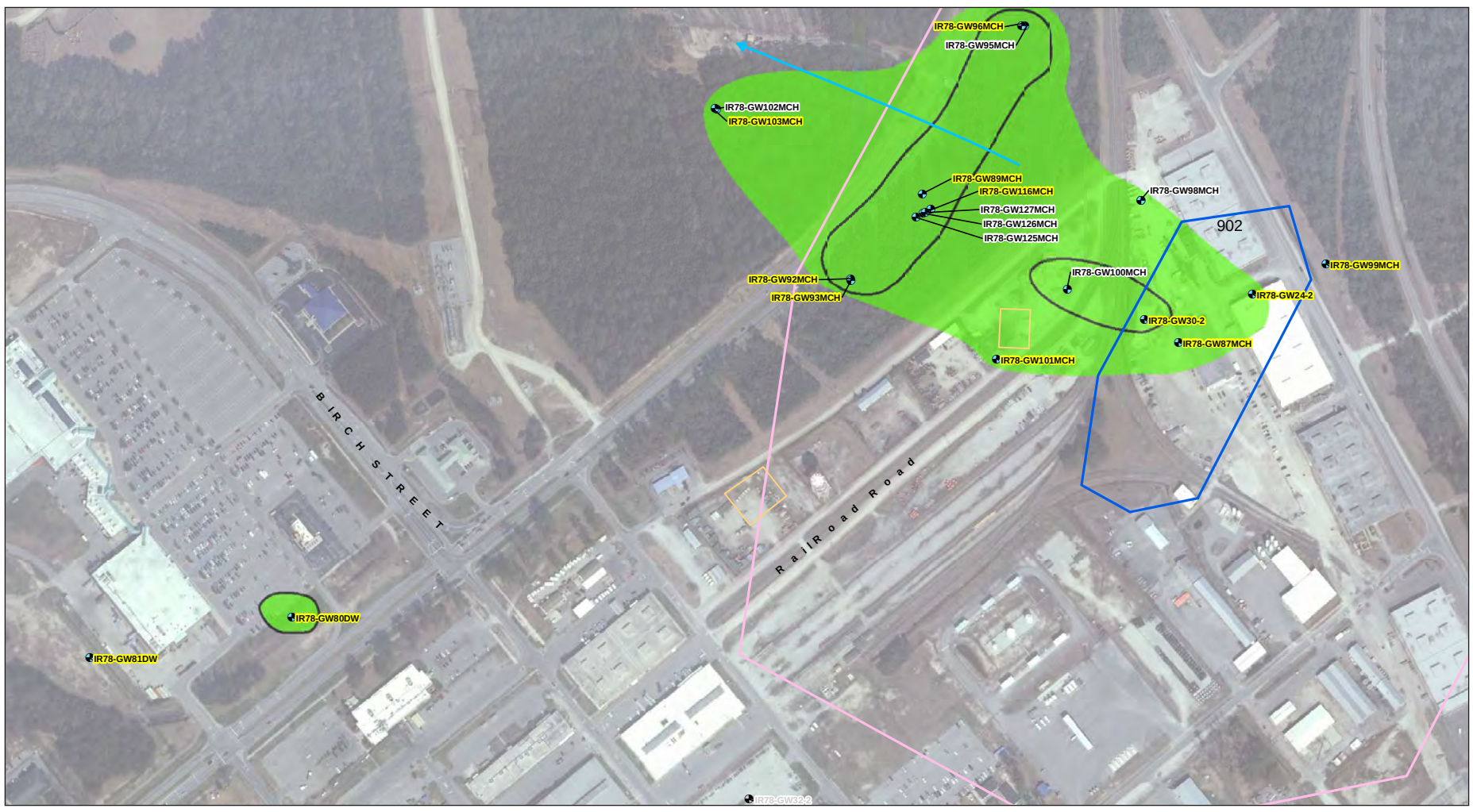
0 150 300 600 Feet

FIGURE 18
Site 78 North - Current and Proposed
LTM Wells - Upper Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL



Current LTM Network (2013)



Proposed LTM Network (2014)

Legend

- Monitoring Well
- Monitoring Well - not sampled

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

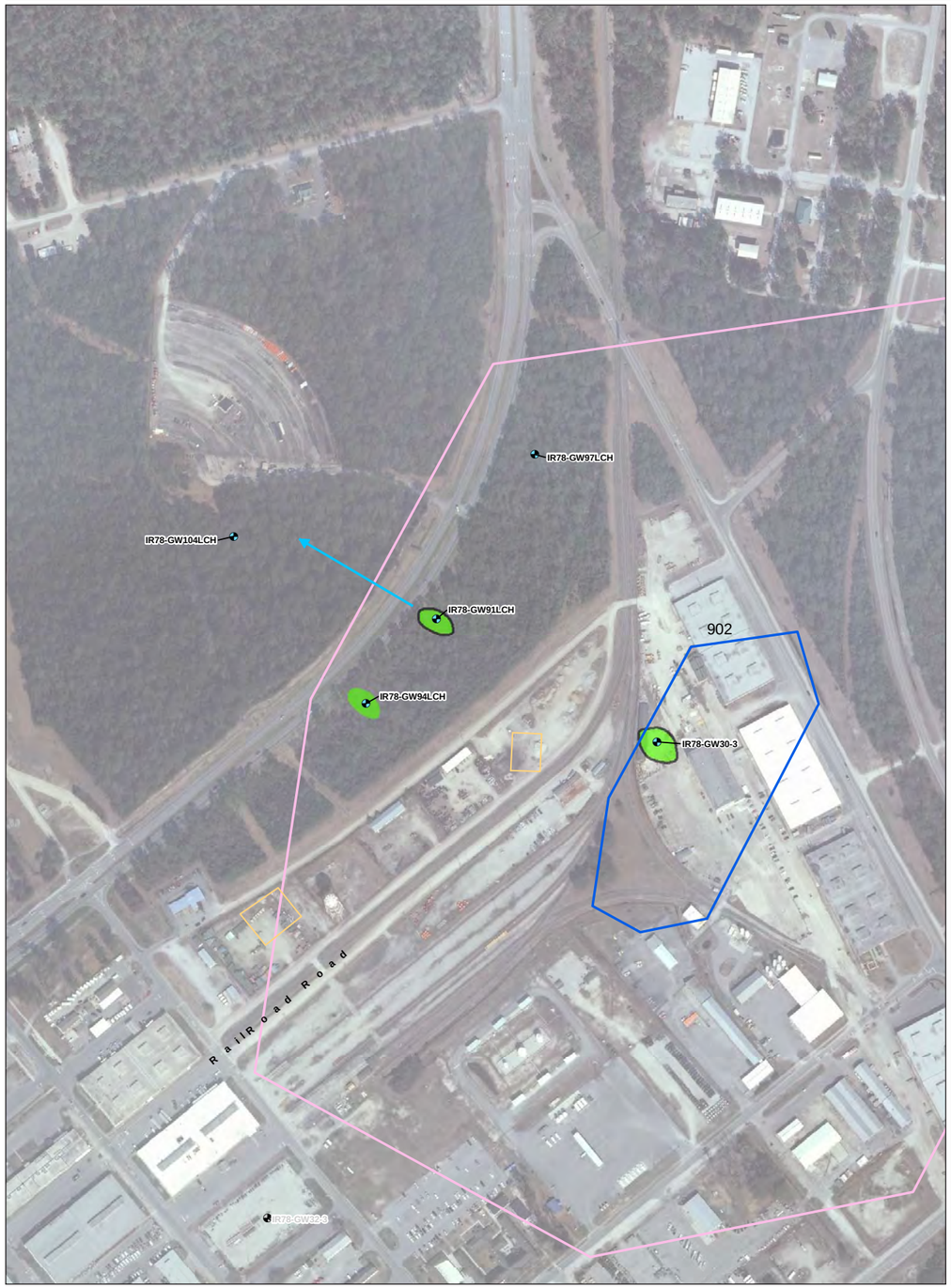
N

0 150 300 600 Feet

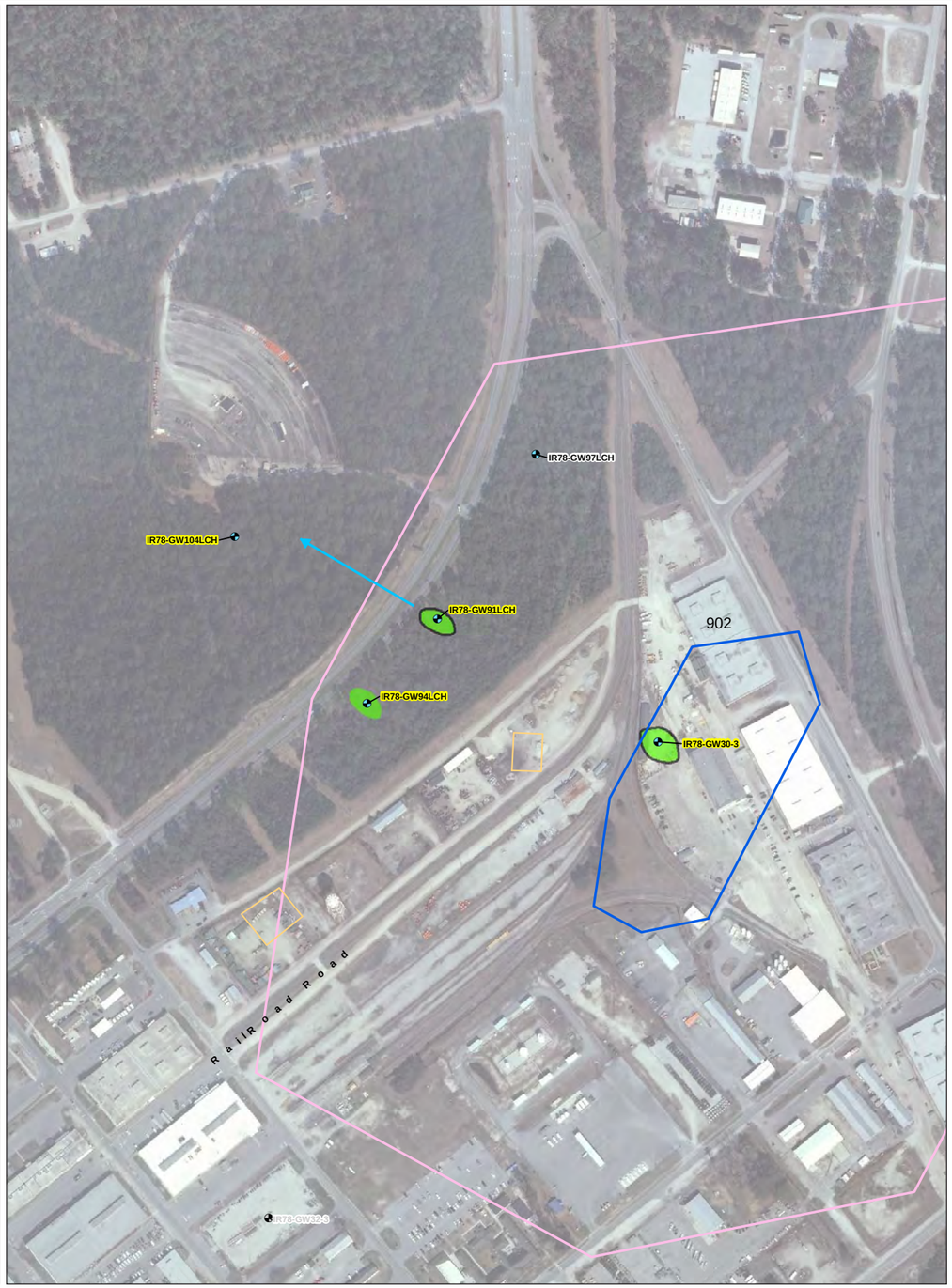
Notes:
- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program
- The LTM network will be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs

FIGURE 19
Site 78 North - Current and Proposed
LTM Wells - Middle Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL



Current LTM Network (2013)



Proposed LTM Network (2014)

Legend

- Monitoring Well
- Monitoring Well - not sampled

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

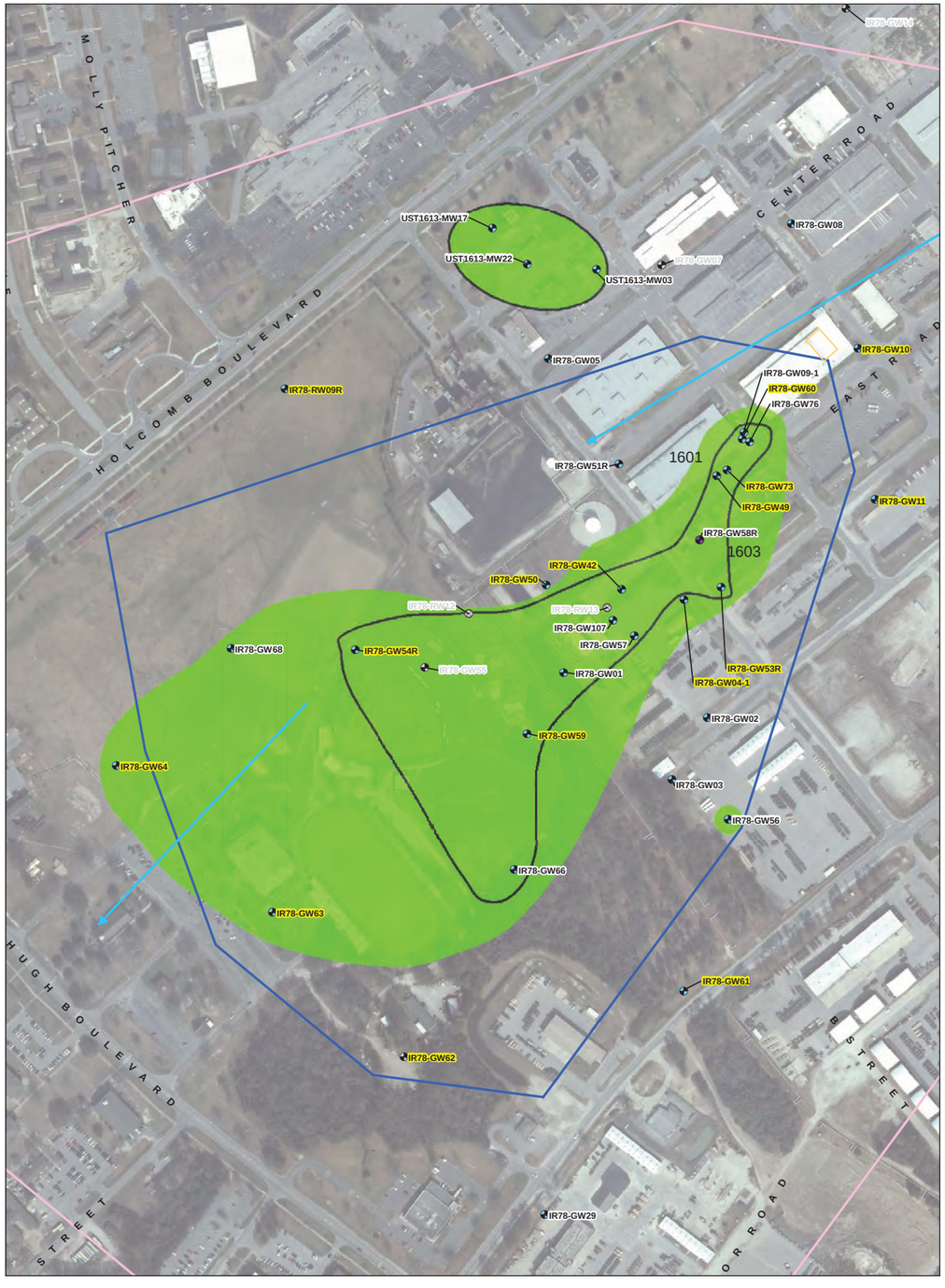
Note:
- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program
- The LTM network will be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs

N

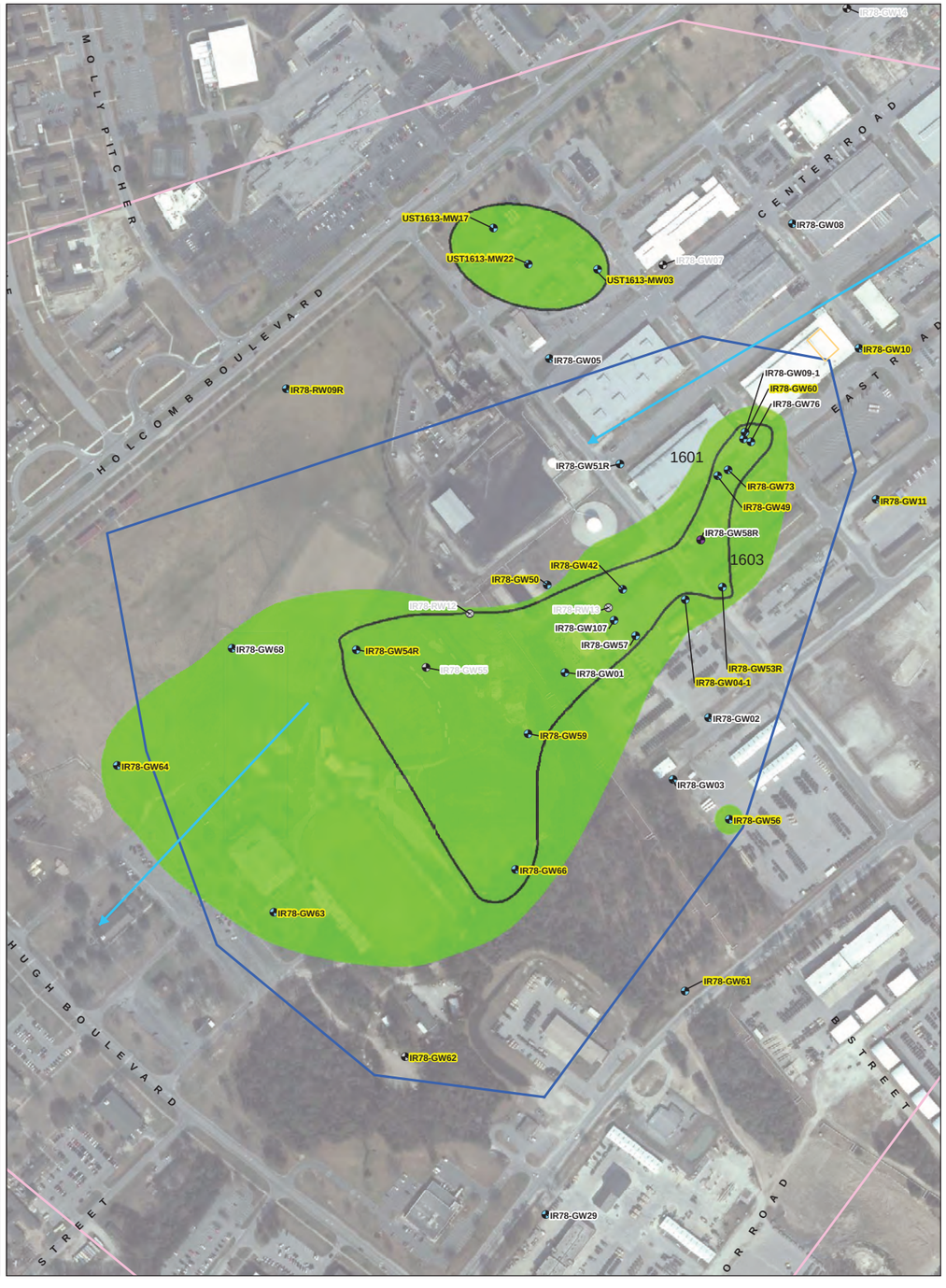
0 150 300 600 Feet

FIGURE 20
Site 78 North - Current and Proposed
LTM Wells - Lower Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL



Current LTM Network (2013)



Proposed LTM Network (2014)

Legend

Monitoring Wells

- Surficial
- Surficial - not sampled
- Monitoring Well Measured LNAPL
- Recovery Well - not sampled
- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

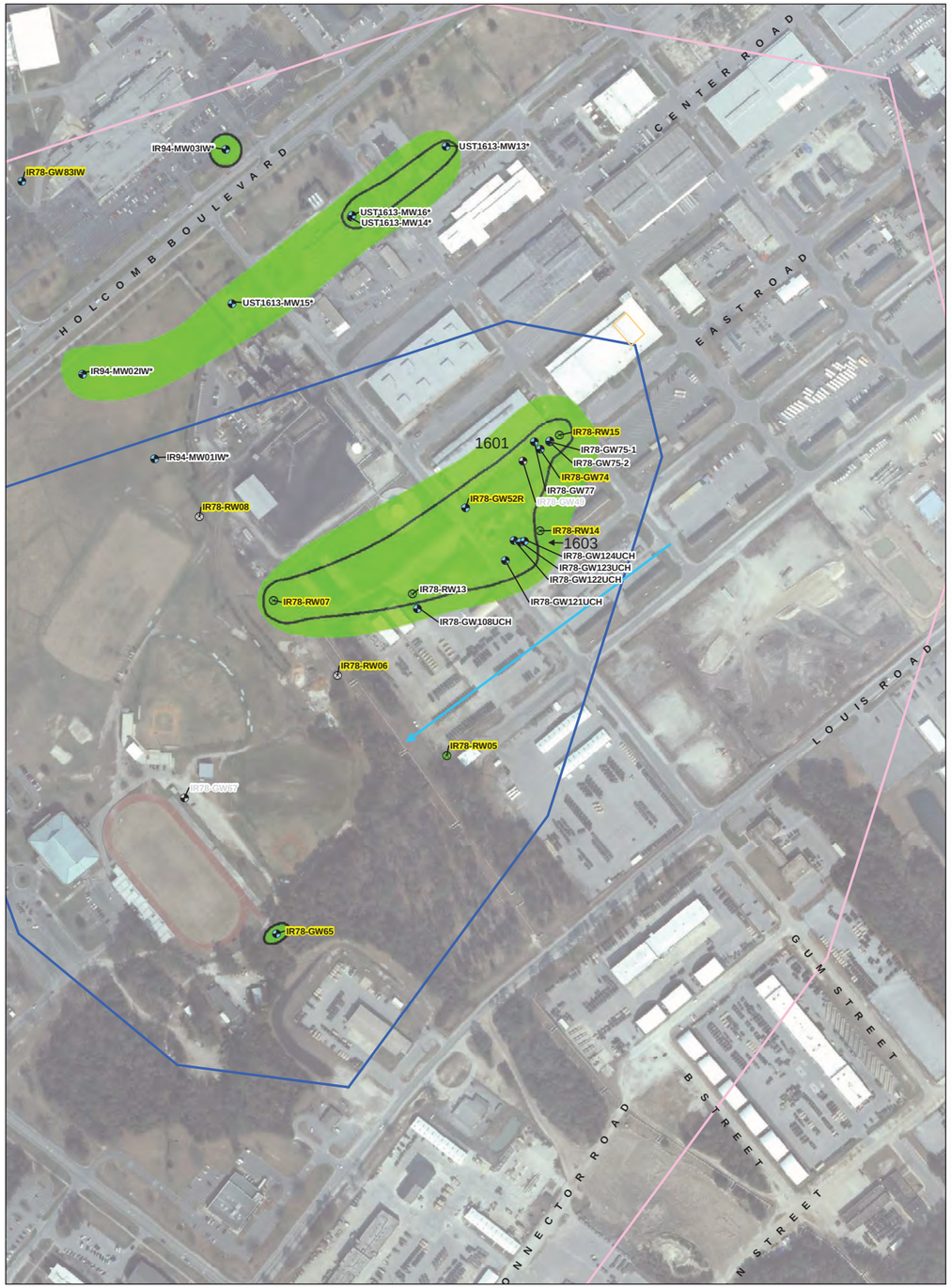
Note:
- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program

N

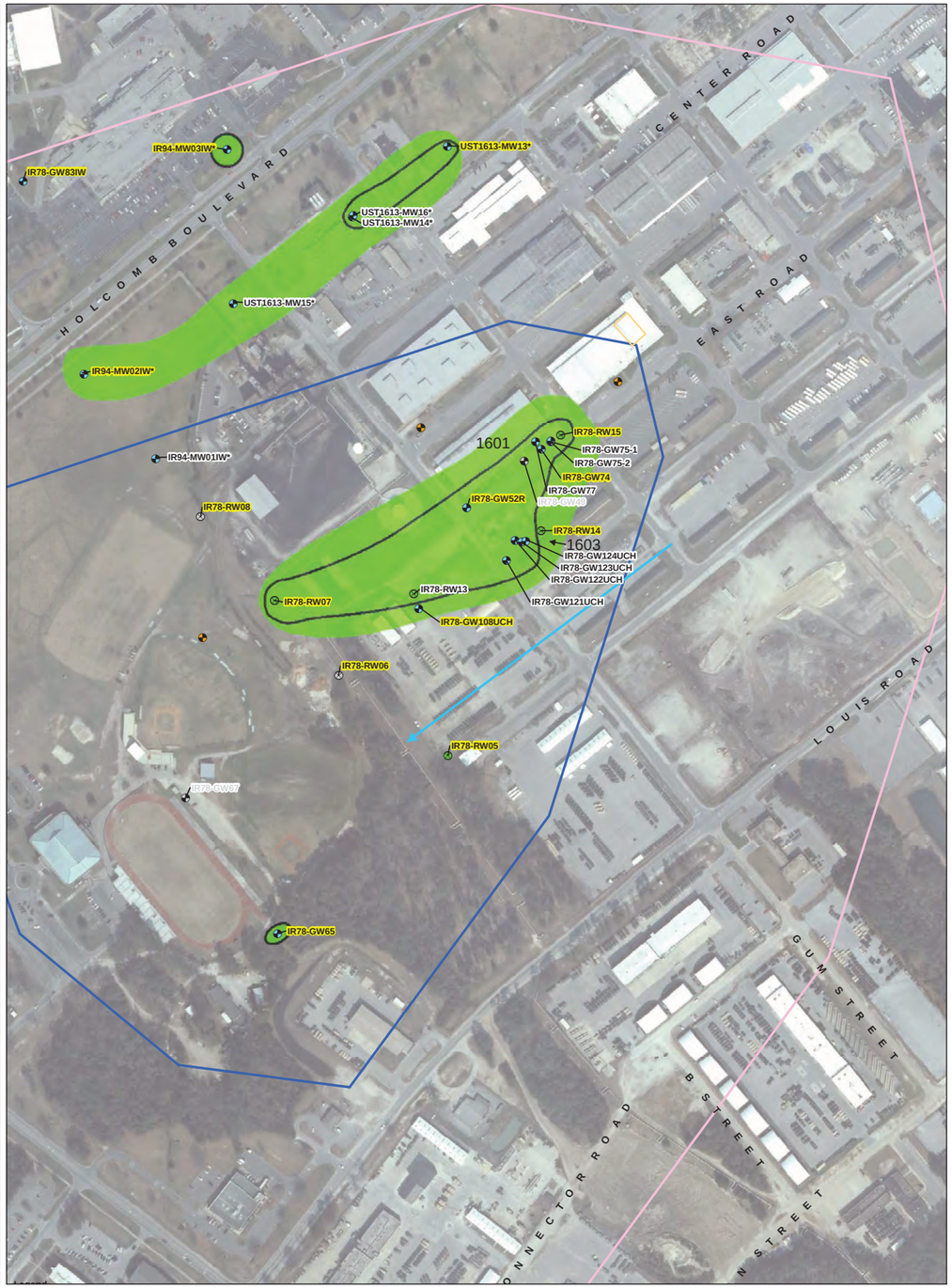
0 150 300
Feet

FIGURE 21
Site 78 South - Current and Proposed
LTM Wells - Surficial Aquifer
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL



Current LTM Network (2013)



Proposed LTM Network (2014)

Legend

- Recovery Well
- Recovery Well - not sampled

Monitoring Wells

- Monitoring Well
- Monitoring Well - not sampled
- Proposed Monitoring Well
- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

Note:
- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program
- * Data collected in February 2009

N

0 150 300 600
Feet

FIGURE 22
Site 78 South - Current and Proposed
LTM Wells - Upper Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

Current LTM Network (2013)

Proposed LTM Network (2014)

Legend

- Monitoring Wells

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Non-Industrial Use Control Boundary
- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

Note:
- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program

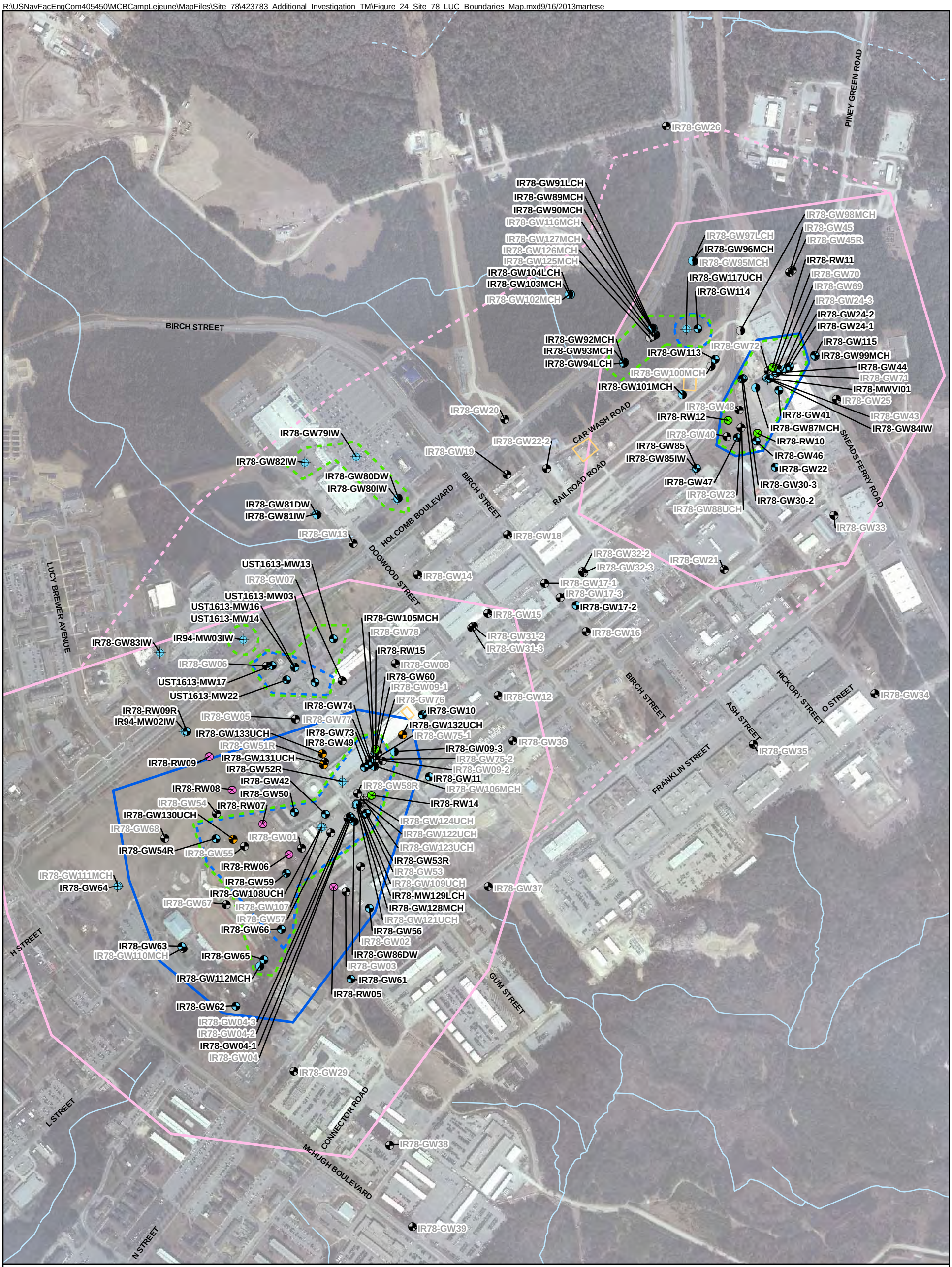
N

0 200 400 800 Feet

FIGURE 23
Site 78 South - Current and Proposed
LTM Wells - Middle Castle Hayne Aquifer
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

R:\USNavFacEngCom405450\MCBCampLejeune\MapFiles\Site_78\423783_Additional_Investigation_TM\Figure_24_Site_78_LUC_Boundaries_Map.mxd9/16/2013martese



Legend

Monitoring Wells

- Surficial Aquifer
- Middle Castle Hayne Aquifer
- Upper Castle Hayne Aquifer
- Lower Castle Hayne Aquifer
- Surficial Aquifer - not in LTM
- Middle Castle Hayne Aquifer - not in LTM
- Upper Castle Hayne Aquifer - not in LTM
- Lower Castle Hayne Aquifer - not in LTM
- Proposed Monitoring Well

Recovery Wells

- Upper Castle Hayne Aquifer - Recovery
- Surficial - Recovery not LTM

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
- Proposed Aquifer Use Control Boundary
- Proposed Intrusive Activity - Industrial/Non-Industrial Use Control Boundary (Vapor Intrusion)
- Proposed Intrusive Activities Control Boundary (Groundwater)

- Surface Water Centerline (inferred)
- Surface Water Centerline

N

0 375 750

Feet

1 inch = 750 feet

Figure 24
Land Use Control Boundaries
Site 78 Techinal Memorandum
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

Attachment A
Boring Logs

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW84IW SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 29.09 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 286712.52, 3839528.18 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary

WATER LEVEL: 10.42 ft BTOC (9/18/2011) START: 2/15/2011 END: 2/15/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
	HA-1	0.0 – 5.0	60	0.1		**SILTY SAND (SM)** Black- brown, damp, medium dense, fine grained, sand with silt, Stained sand under slab. -light gray, very dense.		
5						**SANDY SILT (ML)** Light gray, damp.		
	ST-1	5.0 – 7.0	24	0		**SAND (SP)** White, wet, dense, fine grained, quartz sand.		
10								
	SS-1	10.0 – 12.0	24	0		**SILTY SAND (SM)** Dark gray, wet, loose, very fine grained.		
						No Recovery.		
15								
	SS-2	15.0 – 17.0	24	0.1		**SILT (ML)** Dark gray- brown, moist, stiff. -damp, wood pieces.		
						No Recovery.		
20								
	SS-3	20.0 – 22.0	24	0		**SILT (ML)** Dark gray- brown, damp.		
						No Recovery.		
25								
	SS-4	25.0 – 27.0	24	0		**SAND (SM)** Gray, wet, medium dense, fine grained.		
						No Recovery.		
30								
						(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW84IW SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 29.09 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 286712.52, 3839528.18 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary

WATER LEVEL: 10.42 ft BTOC (9/18/2011) START: 2/15/2011 END: 2/15/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
	SS-5	30.0 32.0	24	0		**SAND (SW)** Gray, wet, dense, cemented clasts with shells.		
						No Recovery.		
35								
	SS-6	35.0 40.0	60	0.1		**SAND (SW)** Gray, wet, dense, cemented clasts with shells. -decrease to very loose sands.		
40								
	MR	40.0 45.0	60	NM			Begin mud rotary at 37'	
45						**SAND (SP)** Gray, wet, loose, fine grained, sand with shell fragments.		
	SS-7	45.0 50.0	60	NM				
50								
	SS-8	50.0 55.0	60	NM				
55								
	SS-9	55.0 60.0	60	NM				
60								
						(soil description on next page)	Boring drilled to 60.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW84IW SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 29.09 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 286712.52, 3839528.18 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary

WATER LEVEL: 10.42 ft BTOC (9/18/2011) START: 2/15/2011 END: 2/15/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
65								
70								
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW85 SHEET 1 OF 1

Soil Boring Log

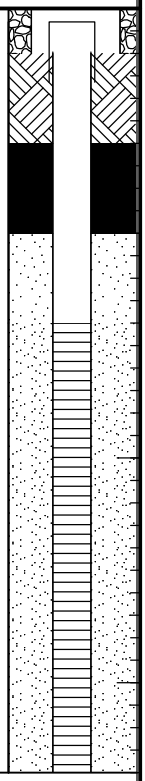
CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.12 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 286539.64, 3839312.54 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger

WATER LEVEL: 7.89 ft BTOC (9/18/2011) START: 2/14/2011 END: 2/14/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
	HA-1	0.0 – 5.0	60	0		**SANDY CLAY (SC)** Light gray with brown streaking, damp, stiff, fine grained. -dark gray.		
5	ST-1	5.0 – 7.0	24	0		**CLAY (CL)** Light gray with brown streaking, damp, very stiff, occational fine grained sand.		
						-saturated.		
10	SS-1	10.0 – 12.0	24	0		-gray, increasing silt content with depth.		
15	SS-2	15.0 – 17.5	30	0		**SILT (ML)** Dark gray- black, damp, low stiffness, silt with fine grained sand, organics present.	Boring drilled to 17.0' bgs to set well.	
						No Recovery.		
20						**SILT (ML)** Dark gray- black, damp, low stiffness, silt with fine grained sand, organics present.		
						End of Boring Log at 20' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
25								
30								



CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW85IW SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.58 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 286537.63, 3839310.30 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary

WATER LEVEL: 11.58 ft BTOC (9/18/2011) START: 2/16/2011 END: 2/16/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**SAND (SP)** Dark brown, surface sod.		
	HA-1		60	0		**CLAY (SC)** Light gray, damp, stiff, fine grained sand.		
5		5.0				-saturated.		
		5.0						
10	SS-1	10.0 12.0	18	0		**SILTY SAND (SM)** Dark gray, saturated, low density, fine grained sand with silt.		
						No Recovery.		
15	SS-2	15.0 17.0	24	0		**SILTY SAND (SM)** Dark gray, saturated, low density, fine grained sand with silt.		
						No Recovery.		
20	SS-3	20.0 22.0	24	0		**SILT (ML)** Dark gray, damp, stiff, silt with fine grained sand, organics present.		
						SILTY SAND (SM) Medium gray, wet, medium density, fine grained sand with silt.		
25						No Recovery.		
	SS-4	25.0 27.0	12	0		**SAND (SP)** Dark gray- black, loose, fine grained.		
30						-limestone, cemented sand and gravel.		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW85IW SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.58 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 286537.63, 3839310.30 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary

WATER LEVEL: 11.58 ft BTOC (9/18/2011) START: 2/16/2011 END: 2/16/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
	MR-1	30.0 35.0	60	0		**SAND (SP)** Dark gray- black, loose, fine grained.	Mud rotary from 30 to 60' bgs	
35	MR-2	35.0 40.0	60	NM		-hard, cemented layer.		
40	MR-3	40.0 45.0	60	NM				
45	MR-4	45.0 50.0	60	NM				
50	MR-5	50.0 55.0	60	NM		**SAND (SW)** Gray, wet, low to medium dense, partially cemented sand with limesotne clasts and silt.		
55	MR-6	55.0 60.0	60	NM				
60						(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW85IW SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.58 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 286537.63, 3839310.30 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary

WATER LEVEL: 11.58 ft BTOC (9/18/2011) START: 2/16/2011 END: 2/16/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
65								
70								
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW86DW SHEET 1 OF 4

Soil Boring Log

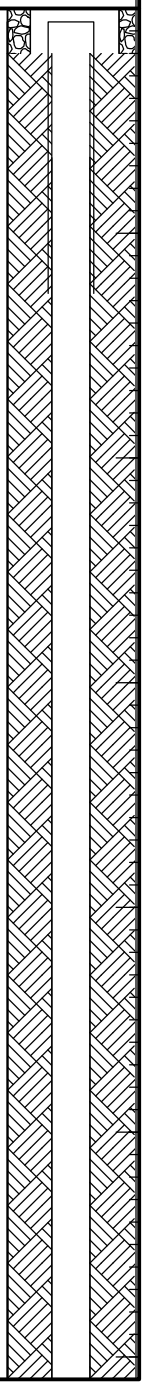
CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.49 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 285713.99, 3838457.03 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger

WATER LEVEL: 17.74 ft BTOC (9/17/2011) START: 2/16/2011 END: 2/16/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SURFACE SOD (PT)**		
	HA-1	5.0	60	0		**SAND (SP)** Light gray, dry, loose, fine grained, trace silt. -orange- brown, saturated.		
5	ST-1	5.0 7.0	12	0		**SILTY SAND (SM)** Medium gray, wet, loose, fine grained, sand with silt.		
10	SS-1	10.0 12.0	6	1.4				
15	SS-2	15.0 17.0	24	0		**SANDY SILT (ML)** Medium to dark gray, moist, soft with medium plasticity, fine grained sand.		
						No Recovery.		
20	SS-3	20.0 22.0	18	0		**SAND (SW)** Light brown- gray, wet, medium dense, fine to very coarse sand, cemented sand and gravel with shell fragments.		
25	SS-4	25.0 27.0	6	0		No Recovery.		
						SAND (SW) Light brown- gray, wet, dense, fine to very coarse sand, cemented sand and gravel with shell fragments.		
30								



PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW86DW SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.49 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 285713.99, 3838457.03 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger

WATER LEVEL: 17.74 ft BTOC (9/17/2011) START: 2/16/2011 END: 2/16/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
	SS-5	30.0 35.0	60	NM		**SAND (SW)** Light brown- gray, wet, dense, fine to very coarse sand, cemented sand and gravel with shell fragments.		
35	SS-6	35.0 40.0	60	NM				
40	SS-7	40.0 45.0	60	NM				
45	SS-8	45.0 50.0	60	NM				
50	SS-9	50.0 55.0	60	NM				
55	SS-10	55.0 60.0	60	NM				
60		60.0						

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW86DW SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.49 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 285713.99, 3838457.03 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger

WATER LEVEL: 17.74 ft BTOC (9/17/2011) START: 2/16/2011 END: 2/16/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65	SS-11	65.0	60	NM		**SAND (SW)** Light brown- gray, wet, dense, fine to very coarse sand, cemented sand and gravel with shell fragments.		
	SS-12	65.0 70.0	60	NM				
70	SS-13	70.0 75.0	60	NM		**SANDY CLAY (SC)** Medium gray, soft to very soft, occasional cemented clasts.		
75	SS-14	75.0 80.0	60	NM				
80	SS-15	80.0 85.0	60	NM				
85	SS-16	85.0 90.0	60	NM		**SAND (SW)** Gray, wet, dense, cemented layers with intermittent fine sand, gravel clasts and shell fragments.		
90		90.0						

PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW86DW SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.49 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters) : 285713.99, 3838457.03 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger

WATER LEVEL: 17.74 ft BTOC (9/17/2011) START: 2/16/2011 END: 2/16/2011 LOGGER : S.Kline/RDU

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
95	SS-17	95.0	60	NM		**SAND (SW)** Gray, wet, dense, cemented layers with intermittent fine sand, gravel clasts and shell fragments.		
	SS-18	95.0 100.0	60	NM		**SAND/GRAVEL (SW/GW)** cemented sand & gravel, abundant shell fragments.		
100						End of Boring Log at 100' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 100.0' bgs to set well.	
105								
110								
115								
120								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW87-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 29.03 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286683.38, 3839506.25 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig, 6-in casing

WATER LEVEL: 11.4 ft BTOC (9/16/2011) START: 7/27/2011 END: 7/27/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SAND (SP)** Brown, dry, loose, fine to medium grained, trace silt.		
	HA-1		60	6.7				
5		5.0						
		5.0				-mottled with greenish gray and black staining, petroleum odor.		
	S1		48	32.7				
		9.0				**SILTY SAND (SM)** Brown with black staining, moist, medium dense, cohesive, strong petroleum odor.		
10		9.0				-wet.		
						CLAYEY SAND (SC) Brown with black staining, wet, medium plastic, soft, cohesive.		
						SAND (SP) Gray, moist, loose, fine to medium grained, petroleum odor.		
	S2		117	527.4				
15						**SILTY SAND (SM)** Gray, wet, medium dense, cohesive, fine to medium grained, petroleum odor.		
		19.0						
		19.0				No Recovery.		
20								
						SANDY SILT (ML) Dark gray, wet, soft, cohesive, very fine sands, trace clay, no odor.		
	S3		78	5		**SANDY CLAY (CL)** Black, dry, low plasticity, medium stiff, large wood debris.		
25								
						SAND (SW) Light greenish gray, moist, loose to medium dense, very fine to medium grained.		
		29.0				-very dark gray.		
		29.0				**SILTY SAND (SM)** Dark gray, wet, loose, very fine to medium grained.		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW87-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 29.03 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286683.38, 3839506.25 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig, 6-in casing

WATER LEVEL: 11.4 ft BTOC (9/16/2011) START: 7/27/2011 END: 7/27/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
35	S4	39.0	120	0.7		**SAND (SW)** Dark gray, moist, loose, medium dense, very fine to medium grained, trace silt. -light greenish gray, very fine to coarse, large fragments of shelly cemented sand.		
40	S5	39.0 49.0	100	0.5		**CLAYEY SAND (SC)** Light greenish gray, wet, loose, few to little fragments of cemented shelly sand. **SILTY SAND (SM)** Greenish gray, wet, medium dense, few to little fragments of cemented shelly sand. **SAND (SW)** Light greenish gray, moist, loose, medium dense, very fine to coarse, large fragments of shelly cemented sand. **SILTY SAND (SM)** Greenish gray, wet, medium dense, trace fragments of cemented shelly sand.		
50						**SILTY SAND (SM)** Greenish gray, wet, medium dense, cemented sand, trace shells. **SAND (SW)** Dark gray, moist, loose, very fine to medium grained.		
55	S6	49.0 59.0	116	2				
60		59.0				No Recovery. (soil description on next page)	8-in temporary casing installed to 60 feet bgs	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW87-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 29.03 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286683.38, 3839506.25 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig, 6-in casing

WATER LEVEL: 11.4 ft BTOC (9/16/2011) START: 7/27/2011 END: 7/27/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						SILTY SAND (SM) Dark gray, moist, dense, gravel-sized shell fragments.		
65	S7		108	0		**SAND (SW)** Gray, wet, very dense, very fine to medium grained, highly cemented.		
		69.0				**SAND (SW)** moist, loose.		
70		69.0				No Recovery.		
						SAND (SW) Gray, wet, very dense, very fine to medium grained, highly cemented.		
75	S8		109	1.5		**SAND (SW)** Gray, moist, loose, very fine to medium grained.		
80		80.0				End of Boring Log at 80' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 81.0' bgs to set well.	
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW88-UCH SHEET 1 OF 2

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.96 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286649.63, 3839409.89 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 10.09 ft BTOC (9/16/2011) START: 8/2/2011 END: 8/2/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SAND (SP)** Tan and orange.		
	HA-1		60	0.2				
5		5.0				**SILT (ML)** Dark brown, moist, loose, some asphalt pieces, strong asphalt smell.		
		5.0				**SANDY SILT (ML)** Medium brown, moist, loose, very fine grained sand.		
	S1		60	1.8				
10		10.0				**SILTY SAND (SM)** Medium tan, moist, loose, fine to very fine grained sand.		
		10.0				**SAND (SP)** Medium gray to medium tan, moist, loose, fine to very fine grained sand.		
15								
20	S2		180	0				
						SANDY CLAY (CL) Medium gray, very moist, medium stiff, fine to very fine grained sand.		
						SAND (SP) Medium gray to medium tan, moist, loose, fine to very fine grained sand.		
25								
30		30.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW88-UCH SHEET 2 OF 2

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.96 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286649.63, 3839409.89 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 10.09 ft BTOC (9/16/2011) START: 8/2/2011 END: 8/2/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		30.0						
35	S3		108	0.5		**SAND (SP)** Light gray, moist, very fine grained sand, sandy limestone, some shell fragments.		
40		40.0				End of Boring Log at 40' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 41.0' bgs to set well.	
45								
50								
55								
60								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW89-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.12 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286433.50, 3839650.42 DRILLING METHOD AND EQUIPMENT : VersaSonic Rlg, 6-in casing

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 9/1/2011 END: 9/1/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
	HA-1	0.0 – 5.0	60	NM		**SAND (SP)** Dark grayish brown, slightly moist, medium dense, very fine to fine grained. -yellowish brown mottled with pale brown.	Lithology from 0-60' taken from IR78GW91-LCH	
5	S1	5.0 – 10.0	37	NM		**SILTY SAND (SM)** very fine to medium grained, trace clay. **SAND (SP)** Yellowish brown, dry, loose to medium dense.		
10	S2	10.0 – 20.0	60	NM		No Recovery. **SAND (SW)** Light gray, wet, loose, fine to coarse grained. **SANDY SILT (ML)** Light gray mottled with yellow, moist, firm, increase in sand content with depth, trace wood debris.		
15								
20	S3	20.0 – 30.0	12	NM		**SAND (SW)** Light gray to white, wet, loose, no silt. No Recovery.		
25								
30						(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW89-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.12 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286433.50, 3839650.42 DRILLING METHOD AND EQUIPMENT : VersaSonic Rlg, 6-in casing

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 9/1/2011 END: 9/1/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
35	S4	30.0 40.0	96	NM		**SAND (SW)** Gray, loose, very fine to coarse grained. -light gray.		
40		40.0						
45	S5	40.0 50.0	120	NM		-pale olive with iron oxide staining, very fine to medium grained.		
50		50.0						
55	S6	50.0 60.0	120	NM		**SILTY SAND (SM)** Dark yellowish brown mottled with tan, medium dense, very fine to coarse grained, trace clay. **SAND (SP)** Pale olive with iron oxide staining mottled with dark gray, loose, medium grained.		
60		60.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW89-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.12 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286433.50, 3839650.42 DRILLING METHOD AND EQUIPMENT : VersaSonic Rlg, 6-in casing

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 9/1/2011 END: 9/1/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S7	65.0	60	0.4		**SAND (SW)** Light yellowish brown, medium dense to loose, very fine to medium grained.		
	NS	65.0 70.0	NM	NM		No Recovery.		
70						End of Boring Log at 70' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 70.0' bgs to set well.	
75								
80								
85								
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW90-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

WATER LEVEL: 14.4 ft BTOC (9/16/2011) START: 8/31/2011 END: 8/31/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
0	HA-1	0.0 – 5.0	60	NM		**SAND (SP)** Dark grayish brown, slightly moist, medium dense, very fine to fine grained.	Lithology from 0-100' taken from IR78GW91-LCH	
5						-yellowish brown mottled with pale brown.		
		5.0				**SILTY SAND (SM)** very fine to medium grained, trace clay.		
	S1		37	NM		**SAND (SP)** Yellowish brown, dry, loose to medium dense.		
10		10.0						
		10.0				No Recovery.		
15	S2		60	NM		**SAND (SW)** Light gray, wet, loose, fine to coarse grained.		
						SANDY SILT (ML) Light gray mottled with yellow, moist, firm, increase in sand content with depth, trace wood debris.		
20		20.0						
		20.0				**SAND (SW)** Light gray to white, wet, loose, no silt.		
						No Recovery.		
25	S3		12	NM				
30		30.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW90-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

WATER LEVEL: 14.4 ft BTOC (9/16/2011) START: 8/31/2011 END: 8/31/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		30.0				**SAND (SW)** Gray, loose, very fine to coarse grained. -light gray.		
35	S4		96	NM				
40		40.0						
		40.0				-pale olive with iron oxide staining, very fine to medium grained.		
45	S5		120	NM		-no iron oxide staining.		
						-iron oxide staining present.		
50		50.0						
		50.0				**SILTY SAND (SM)** Dark yellowish brown mottled with tan, medium dense, very fine to coarse grained, trace clay.		
55	S6		120	NM				
						SAND (SP) Pale olive with iron oxide staining mottled with dark gray, loose, medium grained.		
60		60.0						
		60.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW90-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

WATER LEVEL: 14.4 ft BTOC (9/16/2011) START: 8/31/2011 END: 8/31/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S7		120	NM		**SAND (SW)** Pale olive with trace iron oxide staining, medium dense, very fine to coarse grained. -light olive brown, coarse grained, no silt, shell fragments present. -loose, moderately to weakly cemented sand pieces.		
70		70.0 70.0						
75	S8		120	NM		**SILTY SAND (SM)** Dark gray, medium dense, very fine to medium grained, little to trace gravel-sized shell fragments.		
80		80.0 80.0				**SAND (SW)** Gray, very fine to coarse grained, trace shell fragments. -increase gravel-sized shell fragments.		
85	S9		132	NM		**SILTY SAND (SM)** few shell fragments.		
90		90.0 91.0				-shell fragments increasing with depth.	8-in temporary casing installed to 90 feet bgs	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW90-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

WATER LEVEL: 14.4 ft BTOC (9/16/2011) START: 8/31/2011 END: 8/31/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						SILTY SAND (SM) few shell fragments.		
95	S10		138	NM		**SAND (SW)** Gray, very moist, trace cemented sand pieces within sand. -moderately cemented sand, gravel-sized.		
100		100.0 101.5				**SILTY SAND WITH CLAY (SM)** Light gray, wet, plastic, some clay, abundant gravel-sized pieces of highly cemented sand.		
	S11		60	0		**SAND (SP)** Gray, medium dense to loose, fine to medium grained, no cemented sand pieces or shell fragments.		
105		105.0						
	NS	105.0 110.0	NM	NM		No Recovery.		
110						End of Boring Log at 110' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 110.0' bgs to set well.	
115								
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW91-LCH SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 8/24/2011 END: 8/24/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**SAND (SP)** Dark grayish brown, slightly moist, medium dense, very fine to fine grained.		
	HA-1		60	0		-yellowish brown mottled with pale brown.		
5		5.0				**SILTY SAND (SM)** very fine to medium grained, trace clay.		
	S1		37	0		**SAND (SP)** Yellowish brown, dry, loose to medium dense.		
10		10.0				No Recovery.		
15	S2		60	0		**SAND (SW)** Light gray, wet, loose, fine to coarse grained, trace silt.		
						SANDY SILT (ML) Light gray mottled with yellow, moist, firm, increase in sand content with depth, trace wood debris.		
20		20.0				**SAND (SW)** Light gray to white, wet, loose, no silt.		
						No Recovery.		
25	S3		12	0				
30		30.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW91-LCH SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 8/24/2011 END: 8/24/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		30.0				**SAND (SW)** Gray, loose, very fine to coarse grained, trace silt. -light gray.		
35	S4		96	0				
40		40.0						
		40.0				-pale olive with iron oxide staining, very fine to medium grained, trace silt.		
45	S5		120	0		-no iron oxide staining.		
						-iron oxide staining present.		
50		50.0						
		50.0				**SILTY SAND (SM)** Dark yellowish brown mottled with tan, medium dense, very fine to coarse grained, trace clay.		
55	S6		120	0				
						SAND (SP) Pale olive with iron oxide staining mottled with dark gray, loose, medium grained.		
60		60.0						
		60.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW91-LCH SHEET 3 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 8/24/2011 END: 8/24/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S7		120	1.1		**SAND (SW)** Pale olive with trace iron oxide staining, medium dense, very fine to coarse grained, trace silt. -light olive brown, coarse grained, no silt, shell fragments present.		
						-loose, moderately to weakly cemented sand pieces.		
70		70.0 70.0						
75	S8		120	13.9		**SILTY SAND (SM)** Dark gray, medium dense, very fine to medium grained, little to trace gravel-sized shell fragments.		
80		80.0 80.0				**SAND (SW)** Gray, very fine to coarse grained, trace shell fragments.		
						-increase gravel-sized shell fragments.		
85	S9		132	30		**SILTY SAND (SM)** few shell fragments.		
90		90.0 91.0				-shell fragments increasing with depth.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW91-LCH SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 8/24/2011 END: 8/24/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						SILTY SAND (SM) few shell fragments.		
95	S10		138	61		**SAND (SW)** Gray, very moist, trace cemented sand pieces within sand. -moderately cemented sand, gravel-sized.		
100		100.0 101.5					10-in temporary casing installed to 100 feet bgs	
						SANDY CLAY (CL) Light gray, wet, soft to medium stiffness, medium plasticity.		
105	S11		120	4.4		**SILTY SAND WITH CLAY (SM)** medium dense, some clay, little amounts of gravel-sized highly cemented sand pieces.		
						SAND (SP) Gray, well graded, trace silt, few to little gravel-sized shell fragments.		
110		110.0 110.0						
115	S12		114	6.2		-increase to some gravel-sized shell fragments.		
120		120.0 120.0				**SAND (SW)** abundant gravel-sized shell fragments.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW91-LCH SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 8/24/2011 END: 8/24/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
125	S13	130.0	111	8.6		**SAND (SP)** medium grained, trace silt, trace shell fragments.		
130		130.0					8-in temporary casing installed to 130 feet bgs	
135	S14	140.0	45	6.2		No Recovery.		
140		140.0				**SAND (SP)** medium grained, trace silt, trace shell fragments.		
145	S15	150.0	102	3.4				
150						(soil description on next page)	Boring drilled to 150.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW91-LCH SHEET 6 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 8/24/2011 END: 8/24/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
155						End of Boring Log at 150' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
160								
165								
170								
175								
180								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW92-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.72 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286363.96, 3839567.84 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				**SILT (ML)** Reddish brown with some gray, damp, medium stiff.		Surface Completion: Stick up
5	S1	8.0	72	NM		**SANDY SILT (SM)** Tan to gray.	Lithology from 0-60' taken from IR78GW94-LCH	
		8.0				-gray, stiff.		
10						**SAND (SP)** Tan to gray, wet, dense, grain size increasing with depth.		
15	S2	18.0	96	NM				
		18.0						
20						-gray with orange layers of fine silty sand.		
25	S3	28.0	120	NM				
						SILTY SAND (SM) Gray, 2mm clasts.		
		28.0				**SAND (SP)** Gray with orange layers of fine silty sand.		
30								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW92-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.72 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286363.96, 3839567.84 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
35	S4	38.0	96	NM		**SAND (SP)** Gray with orange layers of fine silty sand.		
40	S5	38.0 48.0	84	NM		-gray, thin silt stringers.		
50	S6	48.0 58.0	108	NM		-light orange with some gray.		
55						**SANDY SILT (SM)** . -dark gray.		
60	S7	58.0 60.0	24	NM				
		60.0				**SAND (SP)** Light gray, very dense.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW92-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.72 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286363.96, 3839567.84 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S8	70.0	120	0		**SAND (SP)** Light gray, very dense.		
70						End of Boring Log at 70' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 70.0' bgs to set well.	
75								
80								
85								
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW93-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.74 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286364.05, 3839566.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
		0.0				**SILT (ML)** Reddish brown with some gray, damp, medium stiff.	
5	S1	8.0	72	0.5		**SANDY SILT (SM)** Tan to gray.	Lithology taken from IR78GW94-LCH
		8.0				-gray, stiff.	
10							
						SAND (SP) Tan to gray, wet, dense, grain size increasing with depth.	
15	S2	18.0	96	5.2			
		18.0					
20						-gray with orange layers of fine silty sand.	
25	S3		120	0.2			
		28.0				**SILTY SAND (SM)** Gray, 2mm clasts.	
		28.0				**SAND (SP)** Gray with orange layers of fine silty sand.	
30							

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW93-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.74 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286364.05, 3839566.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
35	S4	38.0	96	0		**SAND (SP)** Gray with orange layers of fine silty sand.	
40	S5	38.0 48.0	84	0		-gray, thin silt stringers.	
50	S6	48.0 58.0	108	0		-light orange with some gray.	
55						**SANDY SILT (SM)** .	
60		58.0				-dark gray. -gray, dense to very dense, occasional shell fragments.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW93-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.74 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286364.05, 3839566.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
65	S7	68.0	96	0		-dark gray.	
70	S8	68.0 78.0	108	0			
75							
80	S9	78.0 88.0	120	0			
85							
90		88.0				-gray, dense to very dense, partially cemented fossilferous limestone.	8-in temporary casing installed to 90 feet bgs

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW93-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.74 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286364.05, 3839566.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
95	S10	98.0	12	0		-gray, dense to very dense, partially cemented fossilferous limestone.	
100	S11	98.0 108.0	108	0			
105							
110	S12	108.0 110.0	24	0		-gray, dense to very dense, some shell fragments.	
115						End of Boring Log at 110' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	
120							

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW94-LCH SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.65 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**SILT (ML)** Reddish brown with some gray, damp, medium stiff.		
5	S1	8.0	72	0.5		**SANDY SILT (SM)** Tan to gray.		
10	S2	8.0 18.0	96	5.2		-gray, stiff. **SAND (SP)** Tan to gray, wet, dense, grain size increasing with depth.		
20	S3	18.0 28.0	120	0.2		-gray with orange layers of fine silty sand. **SILTY SAND (SM)** Gray, 2mm clasts.		
30		28.0				**SAND (SP)** Gray with orange layers of fine silty sand.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW94-LCH SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.65 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
35	S4	38.0	96	0		**SAND (SP)** Gray with orange layers of fine silty sand.		
40	S5	38.0 48.0	84	0		-gray, thin silt stringers.		
50	S6	48.0 58.0	108	0		-light orange with some gray.		
55						**SANDY SILT (SM)** .		
60		58.0				-dark gray. -gray, dense to very dense, occasional shell fragments.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW94-LCH SHEET 3 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.65 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S7	68.0	96	0		-dark gray.		
70	S8	68.0 78.0	108	0				
75								
80	S9	78.0 88.0	120	0				
85								
90		88.0				-gray, dense to very dense, partially cemented fossilferous limestone.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW94-LCH SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.65 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						-gray, dense to very dense, partially cemented fossilferous limestone.		
95	S10	98.0	12	0				
		98.0						
100	S11	108.0	108	0				
		108.0				-gray, dense to very dense, some shell fragments.		
110	S12	118.0	108	0				
		118.0				-dark gray to gray with olive, very dense, trace silt, some fossil fragments.		
120								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:	
423783.FI.WI	IR78GW94-LCH	SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.65 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
125	S13	128.0	96	0		-gray, dense to very dense, some shell fragments. -gray, abundant fossils. -dark gray to gray with olive, trace fossils.		
130	S14	128.0 138.0	108	0		**SILTY SAND (SM)** Light gray to dark gray.	8-in temporary casing installed to 130 feet bgs	
140	S15	138.0 150.0	108	0		**SAND (SP)** Olive gray, trace to some silt.		
150						(soil description on next page)	Boring drilled to 150.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW94-LCH SHEET 6 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.65 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
155						End of Boring Log at 150' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
160								
165								
170								
175								
180								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW95-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.19 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286533.37, 3839813.31 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 16.15 ft BTOC (9/16/2011) START: 8/22/2011 END: 8/22/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**SILT (ML)** Dark brown with organics, damp, soft.		
						SILTY SAND (SM) Tan.		
5	S1		72	NM		**SAND (SP)** Gray to tan, trace silt.	Lithology from 0-60' taken from IR78GW97-LCH	
		8.0						
		8.0				-gray with orange, saturated, dense.		
10								
	S2		72	NM				
15								
		18.0						
		18.0				**SANDY SILT (SM)** Gray, stiff.		
20						-gray with orange.		
						SAND (SP) Gray with orange and tan, dense.		
25								
	S3		228	NM				
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW95-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.19 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286533.37, 3839813.31 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 16.15 ft BTOC (9/16/2011) START: 8/22/2011 END: 8/22/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
35						**SAND (SP)** Gray with orange and tan, dense.		
		38.0				-dark gray.		
		38.0						
40								
45						-gray with orange.		
	S4		240	NM		**SANDY SILT (SM)** weakly cemented, abundant fossils.		
50								
55						-partially cemented clasts.		
		58.0						
		58.0				**SAND (SP)**		
	S5		24	0		trace silt, trace fossil fragments.		
60		60.0						
		60.0				No Recovery.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW95-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.19 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286533.37, 3839813.31 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 16.15 ft BTOC (9/16/2011) START: 8/22/2011 END: 8/22/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						No Recovery.		
65	S6	70.0	90			**SAND (SP)** Dark gray, wet, loose, medium grained, trace silt. -light gray.		
70						End of Boring Log at 70' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 71.0' bgs to set well.	
75								
80								
85								
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW96-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.40 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286530.14, 3839814.04 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 16.17 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
		0.0				**SILT (ML)** Dark brown with organics, damp, loose.	
						SILTY SAND (SM) Tan.	
5	S1		72	0.3		**SAND (SP)** Gray to tan, trace silt.	Lithology taken from IR78GW97-LCH
		8.0					
		8.0				-gray with orange, saturated, dense.	
10							
	S2		72	0.1			
15							
		18.0					
		18.0				**SANDY SILT (SM)** Gray, stiff.	
20						-gray with orange.	
						SAND (SP) Gray with orange and tan, dense.	
25							
	S3		228	0			
30							

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW96-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.40 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286530.14, 3839814.04 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 16.17 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
35						**SAND (SP)** Gray with orange and tan, dense.	
		38.0				-dark gray.	
40		38.0				-gray with orange.	
45							
	S4		240	0		**SANDY SILT (SM)** weakly cemented, abundant fossils.	
50							
55						-partially cemented clasts.	
		58.0					
		58.0				**SAND (SP)** trace silt, trace fossil fragments.	
60							

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW96-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.40 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286530.14, 3839814.04 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 16.17 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
						SILTY SAND (SM) Gray, weakly cemented.	
						SAND (SP) trace silt.	
65							
	S5		240	0			
70							
						SILTY SAND (SM) .	
75							
		78.0					
		78.0				-weakly cemented to dense, increasing fossils.	
80							
85							
	S6		240	0			
90							8-in temporary casing installed to 90 feet bgs

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW96-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.40 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286530.14, 3839814.04 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LEVEL: 16.17 ft BTOC (9/16/2011) START: END: LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Surface Completion:
95		98.0				**SILTY SAND (SM)** . -partially cemented, abundant fossils.	
100	S7	98.0 110.0	144	0		-trace fossils.	
110						End of Boring Log at 110' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	
115							
120							

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW97-LCH SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.33 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**SILT (ML)** Dark brown with organics, damp, loose.		
						SILTY SAND (SM) Tan.		
5	S1		72	0.3		**SAND (SP)** Gray to tan, trace silt.		
		8.0						
		8.0				-gray with orange, saturated, dense.		
10								
	S2		72	0.1				
15								
		18.0						
		18.0				**SANDY SILT (SM)** Gray, stiff.		
20						-gray with orange.		
						SAND (SP) Gray with orange and tan, dense.		
25								
	S3		228	0				
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW97-LCH SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.33 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
35						**SAND (SP)** Gray with orange and tan, dense.	8-in temporary casing installed to 30 feet bgs	
		38.0				-dark gray.		
40		38.0				-gray with orange.		
45								
	S4		240	0		**SANDY SILT (SM)** weakly cemented, abundant fossils.		
50								
55						-partially cemented clasts.		
		58.0						
		58.0				**SAND (SP)** trace silt, trace fossil fragments.		
60								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW97-LCH SHEET 3 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.33 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						SILTY SAND (SM) Gray, weakly cemented.		
						SAND (SP) trace silt.		
65								
	S5		240	0				
70								
						SILTY SAND (SM) .		
75								
		78.0						
		78.0				-weakly cemented to dense, increasing fossils.		
80								
85								
	S6		240	0				
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW97-LCH SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.33 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
95		98.0				**SILTY SAND (SM)** . -partially cemented, abundant fossils.		
100		98.0				-trace fossils.		
105	S7		240	0				
110						**SAND (SP)** Gray, saturated, dense.		
115		118.0				-very dense, trace silt.		
120		118.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW97-LCH SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.33 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
125						**SAND (SP)** Gray, saturated, dense.		
	S8	128.0	120	0				
130								
	S9		240	0		**SILTY SAND (SM)** Gray, trace fossils.		
135		138.0						
140						**SAND (SP)** Gray, saturated, very dense.		
145								
	S10	148.0	0	0				
150		150.0						
						(soil description on next page)	Boring drilled to 150.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW97-LCH SHEET 6 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.33 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : K.Howell/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
155						End of Boring Log at 150' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
160								
165								
170								
175								
180								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW98-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.77 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286646.40, 3839644.31 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: -- START: 7/26/2011 END: 7/26/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				.		
	HA-1		60	4.1		**SANDY CLAY (CL)** Brown, dry, medium stiff, low plasticity, fine to medium grained.		
5		5.0						
	S1	5.0 9.0	42	9.1		**SILTY SAND (SM)** Light brownish gray, moist, loose, well graded, very fine to medium grained. -saturated.		
10		9.0				**SANDY SILT (ML)** Light brownish gray, soft, very fine grained. -very dark brown.		
	S2		128	3.2		**WELL GRADED SAND (SW)** Light brownish gray, moist, loose, very fine to medium grained.		
15						**SILTY SAND (SM)** Light greenish gray, wet, well graded.		
		19.0						
20		19.0						
	S3		124	2.4				
25						**WELL GRADED SAND (SW)** Reddish yellow, very fine to coarse grained, trace silt.		
		29.0				**CLAYEY SAND (SC)** Light greenish gray, moist, loose, very fine to coarse grained, medium plastic.		
30		29.0				**SILTY SAND (SM)** Light greenish gray, wet, loose, very fine to medium grained.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW98-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.77 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286646.40, 3839644.31 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: -- START: 7/26/2011 END: 7/26/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
35	S4	39.0	84	3		**SILTY SAND (SM)** Light greenish gray, wet, loose, very fine to medium grained.		
40		39.0 49.0	96	0		**SAND (SW)** very fine to coarse grained, trace silt, moderately cemented with 1-in shells.		
45						**SILTY SAND (SM)** Dark gray, medium dense, poorly graded, very fine grained.		
50		49.0				-well graded, very fine to coarse grained.		
55		59.0	134	0		-moist, dense, poorly graded, very fine to fine sand, gravel-sized shell fragments.		
60		59.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW98-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.77 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286646.40, 3839644.31 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: -- START: 7/26/2011 END: 7/26/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65			140	0		**SILTY SAND (SM)** Light gray, wet, medium dense, well graded, very fine to medium grained. -gray.		
		69.0						
70		69.0				**SAND (SW)** Gray, wet, loose, very fine to medium grained, trace silt. -very dense, strongly cemented, large fragments broken up by rig (3-in dia.).	8-in temporary casing installed to 70 feet bgs	
75			120	0				
		79.0						
80		79.0				**SILTY SAND (SM)** Dark gray, moist, dense, very fine to fine grained, gravel-sized shell fragments. -few to trace shell fragments.		
85			140	1.1				
						SAND (SW) Light gray, loose, very fine to medium grained, trace silt.		
90		90.0				(soil description on next page)	Boring drilled to 91.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW98-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.77 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286646.40, 3839644.31 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: -- START: 7/26/2011 END: 7/26/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						End of Boring Log at 90' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
95								
100								
105								
110								
115								
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW99-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286826.79, 3839582.21 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 80-ft, 8-in to 40-ft

WATER LEVEL: 9.3 ft BTOC (9/16/2011) START: 7/26/2011 END: 7/26/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SILT (ML)** Black, dry, loose.		
	HA-1		60	0		**SANDY CLAY (CL)** Tan, slightly moist, very fine grained sand.		
5		5.0				**SAND (SP)** Light gray, loose, very fine to fine grained.		
	S1	5.0	12	0		**SANDY CLAY (CL)** Tan, slightly moist, soft, very fine to fine grained sands.		
10		10.0						
	S2	10.0	12	0				
15								
20		20.0						
	S3	20.0	12	0		**CLAY (CL)** Black, slightly moist, soft, plastic, wood debris. -dary grey, wet, very soft.		
25								
						SAND (SP) Light gray, wet, loose, very fine to fine grained.		
30		30.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW99-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286826.79, 3839582.21 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 80-ft, 8-in to 40-ft

WATER LEVEL: 9.3 ft BTOC (9/16/2011) START: 7/26/2011 END: 7/26/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (Inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		30.0				**SAND (SP)** Light gray, wet, loose, very fine to fine grained.		
						-medium dense.		
35	S4		120	0		-slightly moist, medium grained, limestone, quarter-sized shell fragments.		
						-wet, trace white shell fragments.		
40		40.0						
		40.0					8-in temporary casing installed to 40 feet bgs	
						-dense, partially cemented.		
45	S5		120	0				
50		50.0						
		50.0						
						-dark gray, very moist, loose, very fine to fine grained.		
55	S6		120	0				
60		60.0						
		60.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW99-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286826.79, 3839582.21 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 80-ft, 8-in to 40-ft

WATER LEVEL: 9.3 ft BTOC (9/16/2011) START: 7/26/2011 END: 7/26/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65	S7		120	0		**SILTY SAND (SM)** Medium gray, moist, medium dense, fossils varrying from fragments to 0.5-in in length.		
70		70.0				**SAND (SP)** Medium gray, dense, trace silt.		
		70.0						
75	S8		120	0				
80		80.0				End of Boring Log at 80' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 80.5' bgs to set well.	
85								
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW100-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 30.00 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286574.73, 3839558.00 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.3 ft BTOC (9/16/2011) START: 7/30/2011 END: 7/30/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**SILT/GRAVEL FILL (ML/GW)** Brown silt and gray gravel, dry, loose.		
	HA-1		60	NM				
5		5.0				**SILTY SAND (SM)** Tan to orange, moist, loose, fine to very fine grained.		
		5.0						
	S1		60	0				
10		10.0						
		10.0				**SAND (SP)** Light gray, wet, loose, fine to very fine grained.		
15	S2		120	0.6				
20		20.0						
		20.0						
25	S3		120	0.2				
30		30.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW100-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 30.00 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286574.73, 3839558.00 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.3 ft BTOC (9/16/2011) START: 7/30/2011 END: 7/30/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		30.0				**SAND (SP)** Light gray, wet, loose, fine to very fine grained.		
35	S4		120	0				
40		40.0						
		40.0				**SILTY SAND (SM)** Medium gray, fine to very fine grained, partially cemented clasts, fossil and shell fragments present.		
45	S5		120	0				
						SAND (SP) Medium gray, wet, loose, fine to very fine grained, no shells.		
50		50.0						
		50.0						
55	S6		120	1.8				
60		60.0						
		60.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW100-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 30.00 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286574.73, 3839558.00 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.3 ft BTOC (9/16/2011) START: 7/30/2011 END: 7/30/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						SILT (ML) Light gray, wet, loose, no cementation, shells fragments present.		
65	S7		120	1.8		**SAND (SP)** Medium gray, wet, loose, fine to very fine grained, no shells.		
70		70.0				End of Boring Log at 70' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 71.0' bgs to set well.	
75								
80								
85								
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW101-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.69 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286505.84, 3839489.98 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 13.6 ft BTOC (9/16/2011) START: 7/28/2011 END: 7/28/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
	HA-1	0.0 – 5.0	60	NM		**SILT (ML)** Brown, medium stiff.		
5	S1	5.0 – 10.0	48	0.5		**SANDY CLAY (CL)** Orange and tan mottled, slightly moist, medium stiff, fine to very fine grained sands.		
10								
15	S2	10.0 – 20.0	120	0.7		**SAND (SP)** Tan, wet, loose, fine to very fine grained.		
20						**SILTY SAND (SM)** Dark gray, wet, loose, fine to very fine grained. **SAND (SP)** Gray, wet, loose.		
25	S3	20.0 – 30.0	120	0		**CLAYEY SAND (SC)** Light gray, wet, loose, fine to very fine grained. **SANDY CLAY (CL)** Light gray, wet, medium stiff, fine to very fine grained. **SAND (SP)** Light gray, wet, loose, medium to fine grained.		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW101-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.69 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286505.84, 3839489.98 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 13.6 ft BTOC (9/16/2011) START: 7/28/2011 END: 7/28/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		30.0				**SAND (SP)** Light gray, wet, loose, medium to fine grained. -dark gray.		
35	S4		120	0				
						-medium gray, medium dense, fine to very fine grained, partially cemented, shell fragments present.		
40		40.0						
		40.0						
45	S5		120	0				
						-loose, no cementation, few shell fragments.		
50		50.0						
		50.0				**SANDY CLAY (CL)** Medium to dark gray, slightly moist, stiff, fine to very fine grained, shell fragments present.		
55	S6		120	1.9				
60		60.0						
		60.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW101-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.69 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286505.84, 3839489.98 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 13.6 ft BTOC (9/16/2011) START: 7/28/2011 END: 7/28/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S7	70.0	120	0.3		**CLAYEY SAND (SC)** Medium gray, slightly moist, medium dense, fine to very fine grained, shell fragments present. -sandy limestone, cemented shells in sand matrix. **SAND (SP)** Light gray, moist, loose, trace shell fragments.		
70						End of Boring Log at 70' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 71.0' bgs to set well.	
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW102-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.17 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286233.80, 3839732.88 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 13.41 ft BTOC (9/16/2011) START: 8/2/2011 END: 8/2/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**CLAYEY SAND (SC)** Pale yellow, dry, loose, very fine to fine grained.		
	HA-1		60	NM			Lithology from 0-60' taken from IR78GW104-LCH	
						-light olive brown with iron oxide staining, medium dense.		
5		5.0				-very dense, moderately plastic.		
		5.0						
	S1		48	NM				
		9.0						
		9.0				**SANDY CLAY (CL)** Light olive brown with iron oxide staining, dry, medium stiff, moderately plastic.		
10						**SILTY SAND (SM)** Very dark grayish brown, wet, loose, fine grained sand, trace clay.		
						SAND (SP) Light olive brown, wet, loose, fine to medium grained, trace silt.		
	S2		120	NM				
15						**SAND (SW)** Yellowish brown, wet, loose, coarse grained.		
						CLAYEY SAND (SC) Light brownish gray, loose, medium dense, very fine to fine grained.		
		19.0						
		19.0						
20								
						SANDY CLAY (CL) Very dark grayish brown, wet, soft, highly plastic, fine to medium grained sand.		
	S3		120	NM		**CLAYEY SAND (SC)** Very dark grayish brown, wet, loose, very fine to coarse grained.		
25						**SAND (SW)** Yellowish brown, wet, loose, very fine to coarse grained.		
		29.0						
		29.0				**SAND (SP)** Yellowish brown, wet, loose, very fine to fine grained.		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW102-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.17 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286233.80, 3839732.88 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 13.41 ft BTOC (9/16/2011) START: 8/2/2011 END: 8/2/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						SAND (SP) Yellowish brown, wet, loose, very fine to fine grained.		
35	S4	39.0	115	NM		**SAND (SW)** Light gray, wet, loose to medium dense, very fine to coarse grained, trace silt.		
40	S5	39.0 49.0	72	NM				
45								
50	S6	49.0 59.0	48	NM		No Recovery.		
55						**SAND (SP)** Dark gray, wet, loose, fine to medium grained, trace silt.		
60	S7	59.0 60.0 60.0	12	NM		**SAND (SW)** Pale olive, wet, loose, very fine to medium grained, some silt, trace gravel-sized shell fragments.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW102-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.17 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286233.80, 3839732.88 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 13.41 ft BTOC (9/16/2011) START: 8/2/2011 END: 8/2/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S8	70.0	91	0		**SAND (SW)** Pale olive, wet, loose, very fine to medium grained, some silt, trace gravel-sized shell fragments.		
70						End of Boring Log at 70' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 71.0' bgs to set well.	
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW103-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.19 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286232.07, 3839733.22 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**CLAYEY SAND (SC)** Pale yellow, dry, loose, very fine to fine grained.		
	HA-1		60	NM			Lithology from 0-100' taken from IR78GW104-LCH	
5		5.0				-light olive brown with iron oxide staining, medium dense. -very dense, moderately plastic.		
	S1	5.0	48	NM				
		9.0						
		9.0				**SANDY CLAY (CL)** Light olive brown with iron oxide staining, dry, medium dense, moderately plastic.		
10						**SILTY SAND (SM)** Very dark grayish brown, wet, loose, fine grained sand, trace clay.		
						SAND (SP) Light olive brown, wet, loose, fine to medium grained, trace silt.		
	S2		120	NM				
15						**SAND (SW)** Yellowish brown, wet, loose, coarse grained.		
						CLAYEY SAND (SC) Light brownish gray, loose, medium dense, very fine to fine grained.		
		19.0						
		19.0						
20								
						SANDY CLAY (CL) Very dark grayish brown, wet, soft, highly plastic, fine to medium grained sand.		
	S3		120	NM		**CLAYEY SAND (SC)** Very dark grayish brown, wet, loose, very fine to coarse grained.		
25						**SAND (SW)** Yellowish brown, wet, loose, very fine to coarse grained.		
		29.0						
		29.0				**SAND (SP)** Yellowish brown, wet, loose, very fine to fine grained.		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW103-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.19 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286232.07, 3839733.22 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						SAND (SP) Yellowish brown, wet, loose, very fine to fine grained.		
35	S4	39.0	115	NM		**SAND (SW)** Light gray, wet, loose to medium dense, very fine to coarse grained, trace silt.		
40	S5	39.0 49.0	72	NM				
45								
50	S6	49.0 59.0	48	NM		No Recovery.		
55						**SAND (SP)** Dark gray, wet, loose, fine to medium grained, trace silt.		
60		59.0				**SAND (SW)** Light gray, wet, loose, very fine to coarse grained, trace silt, trace to little clay, trace gravel.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW103-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.19 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286232.07, 3839733.22 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S7	69.0	115	NM		**SAND (SW)** Light gray, wet, loose, very fine to coarse grained, trace silt, trace to little clay, trace gravel.		
70	S8	69.0 79.0	126	NM				
75								
80	S9	79.0 89.0	216	NM		-medium dense.		
85								
90		89.0				-light greenish gray, loose. (soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW103-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.19 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286232.07, 3839733.22 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
95	S10	99.0	114	NM		**SAND (SW)** Light greenish gray, gravel-sized shell fragments and highly cemented sands and shells.		
100		99.0				-little to few shell fragments and cemented sand. -light olive gray, fine to coarse grained, trace grave-sized shell fragments and cemented sand. -medium dense, no gravel-sized shell fragments and cemented sand.		
105	S11		123	0		-loose.		
110		110.0				End of Boring Log at 110' bgs	Boring drilled to 111.0' bgs to set well.	
115						Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW104-LCH SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		0.0				**CLAYEY SAND (SC)** Pale yellow, dry, loose, very fine to fine grained.		
	HA-1		60	0.3				
5		5.0				-light olive brown with iron oxide staining, medium dense.		
		5.0				-very dense, moderately plastic.		
	S1		48	0.6				
		9.0						
		9.0				**SANDY CLAY (CL)** Light olive brown with iron oxide staining, dry, medium dense, moderately plastic.		
10						**SILTY SAND (SM)** Very dark grayish brown, wet, loose, fine grained sand, trace clay.		
						SAND (SP) Light olive brown, wet, loose, fine to medium grained, trace silt.		
	S2		120	2.7				
15						**SAND (SW)** Yellowish brown, wet, loose, coarse grained.		
						CLAYEY SAND (SC) Light brownish gray, loose, medium dense, very fine to fine grained.		
		19.0						
		19.0						
20								
						SANDY CLAY (CL) Very dark grayish brown, wet, soft, highly plastic, fine to medium grained sand.		
	S3		120	2.5		**CLAYEY SAND (SC)** Very dark grayish brown, wet, loose, very fine to coarse grained.		
25						**SAND (SW)** Yellowish brown, wet, loose, very fine to coarse grained.		
		29.0						
		29.0				**SAND (SP)** Yellowish brown, wet, loose, very fine to fine grained.		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW104-LCH SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						SAND (SP) Yellowish brown, wet, loose, very fine to fine grained.		
35	S4	39.0	115	0.7		**SAND (SW)** Light gray, wet, loose to medium dense, very fine to coarse grained, trace silt.		
40	S5	39.0 49.0	72	0.9				
50	S6	49.0 59.0	48	1		No Recovery.		
55						**SAND (SP)** Dark gray, wet, loose, fine to medium grained, trace silt.		
60		59.0				**SAND (SW)** Light gray, wet, loose, very fine to coarse grained, trace silt, trace to little clay, trace gravel.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW104-LCH SHEET 3 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65	S7	69.0	115	2.3		**SAND (SW)** Light gray, wet, loose, very fine to coarse grained, trace silt, trace to little clay, trace gravel.		
70	S8	69.0 79.0	126	2.7				
75								
80	S9	79.0 89.0	216	0.5		-medium dense.		
85								
90		89.0				-light greenish gray, loose. (soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW104-LCH SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
95	S10	99.0	114	0.4		**SAND (SW)** Light greenish gray, gravel-sized shell fragments and highly cemented sands and shells.		
						-little to few shell fragments and cemented sand.		
100	S11	109.0	114	0.4		-trace gravel-sized shell fragments and cemented sand.		
						-no clay.		
110	S12	119.0	108	0.5		-olive gray, moist, medium dense to dense.		
115								
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW104-LCH SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
125	S13	129.0	103	0.7		**SAND (SW)** Light greenish gray, gravel-sized shell fragments and highly cemented sands and shells.		
130	S14	129.0 139.0	120	0		-olive, loose to medium dense, fine to coarse grained. **SILTY SAND (SM)** Olive, moist, medium dense, fine to coarse grained, trace grave-sized shell fragments and cemented sand.	8-in temporary casing installed to 130 feet bgs	
140		139.0				**SAND (SW)** Olive, wet, loose, very fine to coarse grained, trace silt.		
145	S15		108	0				
150		150.0				(soil description on next page)	Boring drilled to 151.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW104-LCH SHEET 6 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.14 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 14 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
155						End of Boring Log at 150' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
160								
165								
170								
175								
180								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW105-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 24.40 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285761.55, 3838592.01 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 80-ft, 8-in to 50-ft

WATER LEVEL: 12.6 ft BTOC (9/16/2011) START: 8/25/2011 END: 8/25/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SAND (SP)** Brown, dry, loose, medium grained.		
	HA-1		60	NM		-very pale brown.	Lithology from 0-60' taken from IR78GW106-MCH	
5		5.0						
		5.0						
	S1		28	NM		**CLAYEY SILT (ML)** Light olive- brown, wet, soft, sitcky, low plasticity, trace sand.		
		9.0				No Recovery.		
		9.0				**SANDY CLAY (CL)** Light yellowish brown mottled with brownish yellow, stiff, high plasticity, medium grained sand.		
10								
	S2		78	NM		**SAND (SP)** Light gray mottled with brownish yellow, moist, loose, medium grained.		
15						**SILTY SAND (SM)** Light gray, moist, medium dense, medium grained sand, trace clay.		
						No Recovery.		
		19.0						
		19.0				**SAND (SP)** Light gray, moist, medium dense, medium grained, trace silt, odor.		
20								
	S3		72	NM				
25						No Recovery.		
		29.0						
		29.0				(soil description on next page)		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW105-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 24.40 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285761.55, 3838592.01 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 80-ft, 8-in to 50-ft

WATER LEVEL: 12.6 ft BTOC (9/16/2011) START: 8/25/2011 END: 8/25/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
35	S4	39.0	76	NM		**SAND (SP)** Light gray, moist, loose, medium grained, trace gravel sized mineral grains, odor.		
						No Recovery.		
40	S5	39.0 49.0	66	NM		**SAND (SW)** Light gray, wet, dense, fine to coarse gained, cobble and gravel-sized pieces of highly cemented sand. -gray, moderately cemented, more loose sand.		
45						No Recovery.		
50	S6	49.0	96	NM		**SAND (SW)** Light gray, wet, dense, fine to coarse gained, trace silt, cobble and gravel-sized pieces of highly cemented sand.	8-in temporary casing installed to 50 feet bgs	
55						No Recovery.		
60		60.0 60.0				**SAND (SW)** Light gray, wet, dense, fine to coarse gained, trace silt, cobble and gravel-sized pieces of highly cemented sand.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW105-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 24.40 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285761.55, 3838592.01 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in casing to 80-ft, 8-in to 50-ft

WATER LEVEL: 12.6 ft BTOC (9/16/2011) START: 8/25/2011 END: 8/25/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65	S7		96	NM		**SAND (SP)** Gray, moist, loose, medium grained, no cemented sands, few to little gravel-sized shell fragments.		
						No Recovery.		
70		70.0				**SAND (SP)** Gray, wet, loose, fine to medium grained, few to little gravel-sized shell fragments.		
75						-trace gravel-sized shell fragments.		
						No Recovery.		
80						End of Boring Log at 80' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 80.0' bgs to set well.	
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW106-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 24.37 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285762.53, 3838590.83 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/110-ft, 8-in/80-ft, 10-in/50-ft

WATER LEVEL: 12.55 ft BTOC (9/16/2011) START: 8/23/2011 END: 8/23/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SAND (SP)** Brown, dry, loose, medium grained.		
	HA-1		60	0.8		-very pale brown.		
5		5.0						
		5.0						
	S1		28	0		**CLAYEY SILT (ML)** Light olive- brown, wet, soft, sitcky, low plasticity, trace sand.		
		9.0				No Recovery.		
		9.0				**SANDY CLAY (CL)** Light yellowish brown mottled with brownish yellow, stiff, high plasticity, medium grained sand.		
10								
	S2		78	0		**SAND (SP)** Light gray mottled with brownish yellow, moist, loose, medium grained.		
15						**SILTY SAND (SM)** Light gray, moist, medium dense, medium grained sand, trace clay.		
		19.0				No Recovery.		
		19.0				**SAND (SP)** Light gray, moist, medium dense, medium grained, trace silt, odor.		
20								
	S3		72	14.7				
25						No Recovery.		
		29.0						
		29.0				(soil description on next page)		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW106-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 24.37 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285762.53, 3838590.83 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/110-ft, 8-in/80-ft, 10-in/50-ft

WATER LEVEL: 12.55 ft BTOC (9/16/2011) START: 8/23/2011 END: 8/23/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
35	S4	39.0	76	4.8		**SAND (SP)** Light gray, moist, loose, medium grained, trace gravel sized mineral grains, odor.		
						No Recovery.		
40	S5	39.0 49.0	66	0		**SAND (SW)** Light gray, wet, dense, fine to coarse gained, cobble and gravel-sized pieces of highly cemented sand. -gray, moderately cemented, more loose sand.		
45						No Recovery.		
50	S6	49.0 59.0	84	0		**SAND (SW)** Light gray, wet, dense, fine to coarse gained, trace silt, cobble and gravel-sized pieces of highly cemented sand.	10-in temporary casing installed to 50 feet bgs	
55						No Recovery.		
60		59.0				**SAND (SW)** Light gray, wet, dense, fine to coarse gained, trace silt, cobble and gravel-sized pieces of highly cemented sand.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW106-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 24.37 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285762.53, 3838590.83 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/110-ft, 8-in/80-ft, 10-in/50-ft

WATER LEVEL: 12.55 ft BTOC (9/16/2011) START: 8/23/2011 END: 8/23/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65	S7	69.0	84	6.8		**SAND (SP)** Gray, moist, loose, medium grained, no cemented sands, few to little gravel-sized shell fragments.		
						No Recovery.		
70	S8	69.0 79.0	108	2.2		**SAND (SP)** Gray, wet, loose, medium grained, few to little gravel-sized shell fragments. -trace gravel-sized shell fragments.		
						No Recovery.		
80	S9	79.0 89.0	114	0		**SAND (SW)** Gray, wet, loose, fine to coarse grained, trace silt, abundant coarse grained shell fragments.	8-in temporary casing installed to 80 feet bgs	
85						**SAND (SP)** Gray, moist, medium dense, fine grained, trace gravel-sized shell fragments. **SILTY SAND (SM)** Gray, moist, medium dense, poorly graded, very fine to fine grained. **SAND (SP)** Gray, moist, medium dense, fine grained, trace gravel-sized shell fragments.		
						No Recovery.		
90		89.0				**SAND (SW)** Gray, wet, dense, fine to coarse gained, trace silt, cobble and gravel-sized pieces of highly cemented sand with large shells.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW106-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 24.37 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285762.53, 3838590.83 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig; 6-in/110-ft, 8-in/80-ft, 10-in/50-ft

WATER LEVEL: 12.55 ft BTOC (9/16/2011) START: 8/23/2011 END: 8/23/2011 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
95	S10	99.0	96	0.3		**SAND (SP)** Gray, moist, medium dense, fine to medium grained, little gravel-sized shell fragments.		
						No Recovery.		
100		99.0				**SAND (SP)** Gray, moist, medium dense, medium grained, little gravel-sized shell fragments.		
105	S11		108	0.2		-abundant gravel-sized shell fragments.		
		110.0				End of Boring Log at 108' bgs	Boring drilled to 109.0' bgs to set well.	
110						Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
115								
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW107 SHEET 1 OF 2

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.93 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285635.61, 3838445.05 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.56 ft BTOC (9/16/2011) START: 8/13/2011 END: 8/13/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				No Recovery.		
	HA-1		60	NM			Lithology from 0-20' taken from IR78GW108-UCH	
5		5.0						
		5.0				**SANDY SILTY CLAY (CL)** Light gray, wet, soft.		
	S1		60	NM				
10		10.0				**SILTY SAND (SM)** fine grained.		
		10.0				**SANDY CLAY (CL)** Gray, medium plasticity, some silt.		
15	S2		120	NM				
20		20.0				**SAND (SP)** Tan, loose.		
		20.0				**SILTY SAND (SM)** Orange, iron nodules.		
						SANDY SILTY CLAY (CL) Gray, moist, very soft, low plasticity, fine grained.		
25	S3		120	NM				
						SILTY SAND (SM) Tan, medium dense.		
						-wet, partially cemented sand, shell fragments.		
30		30.0				(soil description on next page)	Boring drilled to 30.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW107 SHEET 2 OF 2

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.93 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285635.61, 3838445.05 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.56 ft BTOC (9/16/2011) START: 8/13/2011 END: 8/13/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						End of Boring Log at 30' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
35								
40								
45								
50								
55								
60								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW108-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.85 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285634.40, 3838443.52 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 60-ft, 8-in to 40-ft

WATER LEVEL: 17.75 ft BTOC (9/16/2011) START: 8/11/2011 END: 8/11/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
	HA-1	0.0 – 5.0	60	NM				
5	S1	5.0 – 10.0	60	0		**SANDY SILTY CLAY (CL)** Light gray, wet, soft.		
10						**SILTY SAND (SM)** fine grained.		
	S2	10.0 – 20.0	120	0		**SANDY CLAY (CL)** Gray, medium plasticity, some silt.		
15								
20						**SAND (SP)** Tan, loose.		
						SILTY SAND (SM) Orange, iron nodules.		
	S3	20.0 – 30.0	120	0		**CLAYEY SAND (SC)** Tan, wet, dense, partially cemented sand.		
25								
						SAND (SW) Light gray, partially cemented, abundant shell and fossil fragments.		
30								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW108-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.85 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285634.40, 3838443.52 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 60-ft, 8-in to 40-ft

WATER LEVEL: 17.75 ft BTOC (9/16/2011) START: 8/11/2011 END: 8/11/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		30.0						
35	S4		120	0		**SAND (SP)** Grayish tan, medium dense, fine grained, trace partially cemented sand, trace shell pieces.		
40		40.0						
		40.0					8-in temporary casing installed to 40 feet bgs	
45	S5		120	0				
50		50.0						
		50.0				**CLAYEY SAND (SC)** Grayish tan, medium dense, partially cemented sand, shell pieces presnt.		
55	S6		120	0				
						SILTY SAND (SM) Grayish brown, wet, medium dense, fine grained.		
60		60.0						
						(soil description on next page)	Boring drilled to 60.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW108-UCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.85 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285634.40, 3838443.52 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 60-ft, 8-in to 40-ft

WATER LEVEL: 17.75 ft BTOC (9/16/2011) START: 8/11/2011 END: 8/11/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
70								
75								
80								
85								
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW109-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.75 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285725.06, 3838494.15 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 16.11 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SANDY SILT (ML)** Light brown, dry, loose, trace fill gravel.		
	HA-1		60	0		**SAND (SP)** Light tan, slightly moist, very loose, fine to very fine grained sands.		
5		5.0						
		5.0				**CLAYEY SAND (SC)** Medium gray, very moist, loose, fine to very fine grained sands.		
	S1		60	0				
10		10.0						
		10.0				**SANDY CLAY (CL)** Light gray, moist, medium stiff, very fine grained sand.		
						CLAY (CL) Dark gray, wet, soft, trace silt.		
15	S2		120	1.5				
						SILTY SAND (SM) Tan to gray, slightly moist, medium dense, fine to very fine grained sands, partially cemented.		
20		20.0						
		20.0				**SAND (SP)** Tan, moist, very coarse to medium grained sands, partially cemented clasts.		
25	S3		120	0				
30		30.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW109-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.75 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285725.06, 3838494.15 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 16.11 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		30.0				**SAND (SP)** Tan, moist, very coarse to medium grained sands, partially cemented clasts.		
35	S4		120	0		**SILTY SAND (SM)** Tan and dark brown laminations, medium to very fine grained sands, partially cemented.		
40		40.0						
		40.0				**SAND (SP)** Tan, very moist, loose, fine to very fine, trace shell fragments.		
45	S5		120	0				
						SAND (SW) Tan, very moist, medium dense, coarse to very fine, partically cemented, shell fragments with trace bivalve fossils.		
50		50.0				**CLAY (CL)** wet, very soft to soft, very sticky, no cementation, shell fragments.		
		50.0						
55	S6		120	0		**SILTY SAND (SM)** >50% bivalve shells, large bivalve nodules.		
						SANDY SILT (ML) Medium gray, slightly moist, loose to medium dense, trace shell fragments.		
60		60.0						
						(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW109-UCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.75 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285725.06, 3838494.15 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 16.11 ft BTOC (9/16/2011) START: 7/29/2011 END: 7/29/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Boring drilled to 61.0' bgs to set well.	
65								
70								
75								
80								
85								
90								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW110-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.24 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285299.92, 3838150.37 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 19.35 ft BTOC (9/16/2011) START: 8/10/2011 END: 8/10/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
	HA-1	0.0 – 5.0	60	NM				
5		5.0				No Recovery.		
	NS	5.0 – 10.0	NM	0				
10		10.0				**SAND (SP)** Yellow-orange and tan, wet, loose, fine grained.		
15						**SILTY SAND (SM)** Gray, wet, soft, fine grained.		
20	S1	10.0 – 30.0	240	0		**CLAY (CH)** moist, soft, fine grained.		
25						**SANDY CLAY (CL)** Gray to yellow-orange, moist, soft, fine grained.		
30		30.0				**SILTY SAND (SM)** Yellow-orange and tan-gray, wet, loose, fine grained.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW110-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.24 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285299.92, 3838150.37 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 19.35 ft BTOC (9/16/2011) START: 8/10/2011 END: 8/10/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		30.0				**SILTY SAND (SM)** Tan to gray, medium dense, partially cemented sand, trace shell fragments.		
35	S2		120	0		-increased cemented sand.		
40		40.0 40.0						
45	S3		120	0		**SAND (SP)** Light gray, wet, loose to medium dense, fine grained.		
50		50.0 50.0						
55	S4		120	0		-trace shell fragments. -partially cemented sand.		
						SILTY SAND (SM) Gray, medium dense, fine grained, trace shell fragments.		
60		60.0 60.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW110-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.24 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285299.92, 3838150.37 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 19.35 ft BTOC (9/16/2011) START: 8/10/2011 END: 8/10/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65	S5	70.0	120	0		**SAND (SP)** Grayish tan, saturated, medium dense, fine grained, trace shell fragments.		
70	S6	70.0 80.0	120	0				
75								
80		80.0				No Recovery.		
85	S7	90.0	72	0		**SILTY SAND (SM)** Grayish tan, saturated, medium dense, fine grained, trace shell fragments.		
90						(soil description on next page)	Boring drilled to 90.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW110-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.24 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285299.92, 3838150.37 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 19.35 ft BTOC (9/16/2011) START: 8/10/2011 END: 8/10/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						End of Boring Log at 90' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
95								
100								
105								
110								
115								
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW111-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.81 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285143.08, 3838301.21 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.76 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		0.0				**SILT (ML)** Brown, moist, loose.		
	HA-1		60	NM		**SANDY CLAY (CL)** Tan with orange mottling, slightly moist, medium stiff, fine to very fine grained sands.		
5		5.0						
		5.0						
	S1		60	0				
						SAND (SP) Medium gray, wet, loose, fine to very fine grained sands.		
10		10.0						
		10.0				**CLAYEY SAND (SC)** Medium to dark gray, wet, loose.		
						CLAY (CL) Medium to dark gray, very moist, soft. -tan to orange, very fine grained sand, trace sand.		
15	S2		120	0				
20		20.0						
		20.0						
25	S3		120	0		**CLAYEY SAND (SC)** Tan to orange, some iron oxide, very moist, loose, cemented gravel-sized clasts.		
30		30.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW111-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.81 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285143.08, 3838301.21 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.76 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
		30.0				**SAND (SP)** Medium gray, moist, loose, sand with shell fragments.		
35	S4		120	0				
40		40.0						
		40.0				**SILTY SAND (SM)** Medium gray, wet, loose, fine to very fine grained sands, shell fragments and white toothpick looking fragments (up to 0.5-in long).		
45	S5		120	0				
50		50.0				**SAND (SP)** Medium gray, wet, loose, fine to very fine grained sands, shell fragments and white toothpick looking fragments (up to 0.5-in long).		
		50.0						
55	S6		120	0		-moist, medium dense, cemented. -partially cemented.		
60		60.0				-very moist, loose.		
		60.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW111-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.81 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285143.08, 3838301.21 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.76 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						-very moist, loose.		
65	S7		120	0				
70		70.0						
		70.0						
75	S8		120	0				
80		80.0						
		80.0						
85	S9		120	0		**SILTY SAND (SM)** Medium gray, moist, dense, fine to very fine grained sands.		
						SAND (SP) Medium gray, very moist, loose, fine to very fine grained sands, partially cemented, shell fragments and white toothpick looking fragments (up to 0.5-in long).		
90		90.0				(soil description on next page)	Boring drilled to 91.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW111-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.81 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285143.08, 3838301.21 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing

WATER LEVEL: 17.76 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER : J.Albano/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
						End of Boring Log at 90' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
95								
100								
105								
110								
115								
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW112-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.68 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285486.29, 3838106.85 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 90-ft, 8-in to 60-ft

WATER LEVEL: 21.56 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
	HA-1	0.0 – 5.0	60	0				
5		5.0 – 10.0	24	0		**SANDY SILT (ML)** Brown, dry, loose, fine grained.		
10		10.0 – 15.0	60	0		**SILTY SAND (SM)** Very light tan, dry, loose, fine grained.		
15		15.0 – 20.0	60	0		**SAND (SP)** Light tan, wet, loose, fine grained. **SILTY SAND (SM)** Orange- gray, wet, soft, fine grained. **SAND (SW)** Tan, dry, loose, fine to medium grained, trace sand clasts.		
20		20.0 – 25.0	60	0		**SILTY CLAYEY SAND (SC)** Gray, wet, medium dense, fine grained. .		
25		25.0 – 30.0	60	0		**SAND (SP)** Light tan to gray, wet, loose, fine grained. **SANDY CLAY (CL)** Light tan to gray, moist, soft, fine grained.		
30		30.0 –				(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW112-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.68 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285486.29, 3838106.85 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 90-ft, 8-in to 60-ft

WATER LEVEL: 21.56 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
		30.0				**SAND (SW)** Tan, wet, loose to medium dense, shell fragments.		
		35.0	60	0		**SILTY SAND (SM)** Gray, partially cemented sand, fossilferous shell fragments.		
35		35.0				-decreasing partially cemented sand, decreasing fossilferous shell fragments.		
		40.0	60	0				
40		40.0						
		45.0	60	0				
45		45.0				**SAND (SP)** Grayish tan, wet, medium dense, trace silt.		
		50.0	60	0				
50		50.0				**SILTY SAND (SM)** Gray, wet, medium dense, fine grained, fossilferous shell fragments.		
						SAND (SW) Grayish tan, partially cemented sand, some clayey sand matrix.		
55			120	0		-trace shell fragments.		
						-dense.		
60		60.0					8-in temporary casing installed to 60 feet bgs	
		60.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW112-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.68 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285486.29, 3838106.85 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 90-ft, 8-in to 60-ft

WATER LEVEL: 21.56 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
65			120	0		**SAND (SP)** Light tan, wet, medium dense, poorly graded, fine grained.		
						-light gray.		
70		70.0						
		70.0						
75			120	0				
80		80.0						
		80.0				**SILTY SAND (ML)** Light gray, wet, medium dense, fine grained, trace shell fragments.		
85			120	0				
						-dense, partially cemented sand.		
90		90.0						
						(soil description on next page)	Boring drilled to 90.0' bgs to set well.	

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW112-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.68 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285486.29, 3838106.85 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig, 6-in casing to 90-ft, 8-in to 60-ft

WATER LEVEL: 21.56 ft BTOC (9/16/2011) START: 8/9/2011 END: 8/9/2011 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
						End of Boring Log at 90' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run		
95								
100								
105								
110								
115								
120								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW113 SHEET 1 OF 1

Soil Boring Log

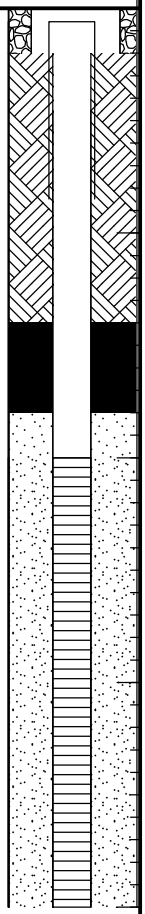
CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.92 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286585.29, 3839575.01 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 11.42 ft BTOC (5/25/2012) START: 3/31/2012 END: 3/31/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
	HA-1	0.0 – 5.0	60	0		**SILTY SAND (SM)** Tan, loose, fine grained.		
5	RS-1	5.0 – 10.0	60	0		**SILTY SAND (SM)** Tan/yellow-orange, dry to damp, loose, fine grained.		
10	RS-2	10.0 – 15.0	60	0.6 0.6		**SAND (SP)** Yellow-orange, damp, loose, medium grained. -wet. -color change to light gray, medium dense, fine grained. **SILTY SAND (SM)** Gray, wet, medium dense, fine grained.		
15	RS-3	15.0 – 20.0	60	0.5 0		-color change to brown, moist, soft, fine grained, peat, organic. **SAND (SP)** Light gray, wet, loose, fine grained.		
20						End of Boring Log at 20' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
25								
30								



CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW114 SHEET 1 OF 1

Soil Boring Log

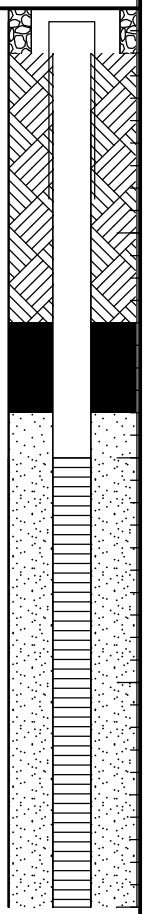
CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.37 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286543.17, 3839648.92 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 14.95 ft BTOC (5/13/2012) START: 4/1/2012 END: 4/1/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0		NM		**SILTY SAND (SM)** Tan, loose, fine grained.		
	HA-1		60					
5		5.0						
		5.0		0.7		**SILTY SAND (SM)** Tan/yellow-orange, dry, medium dense, fine grained.		
	RS-1		60					
				0.4				
10		10.0						
		10.0		0.3		-color change to yellow-orange, moist.		
						SAND (SP) Light tan, wet, loose, fine grained.		
				0.2				
15	RS-2		120					
				0.4				
20		20.0						
						End of Boring Log at 20' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
25								
30								



PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW115 SHEET 1 OF 1

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.64 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286825.68, 3839584.88 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 5.88 ft BTOC (5/25/2012) START: 3/31/2012 END: 3/31/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
0	HA-1	0.0 – 5.0	60	NM		**SILTY SAND (SM)** Tan, loose, fine grained.		
5	RS-1	5.0 – 10.0	36	0		No Recovery.		
10	RS-2	10.0 – 15.0	12	0		**SILTY SAND (SM)** Tan/yellow-orange, moist, medium dense, fine grained. -color change to tan, wet, loose/soft. No Recovery.		
15	RS-3	15.0 – 20.0	36	0		**SAND (SP)** Gray, wet, loose/soft, fine grained.		
20						End of Boring Log at 20' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
25								
30								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW116-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286441.82, 3839635.02 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 11.94 ft BTOC (3/30/2012) START: 3/28/2012 END: 3/28/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				**SILTY SAND (SM)** Dark gray, dry, loose.		
	HA-1		60	NM				
5		5.0						
		5.0				**SANDY SILT (ML)** Dark gray/tan, dry, loose, fine grained, organic, trace roots.		
	RS-1		60	0				
10		10.0				**SILTY SAND (SM)** Tan/yellow-orange, dry, loose, fine grained.		
		10.0				**SAND (SP)** Tan, moist, loose, fine grained.		
						SILTY SAND (SM) Yellow-orange, moist, loose, fine grained.		
15	RS-2		120	0				
						SAND (SP) Tan, moist/wet, loose, fine grained. -color change to light gray.		
						SANDY CLAY (CL) Light gray, damp, stiff, fine grained sand, low plasticity.		
20		20.0						
		20.0				**SANDY SILTY CLAY (CL)** Light gray, moist, soft, fine grained.		
						SILTY SAND (SM) Tan, wet, loose, fine grained.		
25						**SAND (SP)** Light tan, wet, loose, fine grained. -sandy clay lens @ 27ft.		
30	RS-3		240	0				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW116-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286441.82, 3839635.02 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 11.94 ft BTOC (3/30/2012) START: 3/28/2012 END: 3/28/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35						**SAND (SP)** Light tan, wet, loose, fine grained.		
40		40.0 40.0						
45				0		**SILTY SAND (SM)** Tan/yellow-orange, wet, loose, fine grained.		
50	RS-4		240			**SAND (SP)** Yellow-orange, wet, loose, fine grained.		
55				2.7		**SILTY SAND (SM)** Yellow-orange, fine grained. **SANDY SILT (ML)** Tan, dry, dense, fine grained.		
				10.3		-color change to dark gray.		
60		60.0 60.0				**SILTY SAND (SM)** Tan/yellow-orange/gray, damp, loose, fine grained. (soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:	
423783.FI.WI	IR78GW116-MCH	SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286441.82, 3839635.02 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 11.94 ft BTOC (3/30/2012) START: 3/28/2012 END: 3/28/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
65	RS-5	70.0	120	0 1.1		**SAND (SP)** Tan, wet, loose, fine grained.		
70	RS-6	70.0 80.0	120	0 4.3 17.1		**SILTY SAND (SM)** Tan, wet, medium dense, fine grained, trace shell pieces. -color change to gray, loose.		
80	RS-7	80.0 90.0	120	34.1 10.7 18.7		**SILTY SAND (SM)** Gray, wet, loose to medium dense, partially cemented sand with shell fragments. **SILTY SAND (SM)** Gray, wet, dense, fine grained, trace shell pieces.		
85								
90		90.0						

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW116-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286441.82, 3839635.02 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 11.94 ft BTOC (3/30/2012) START: 3/28/2012 END: 3/28/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
95	RS-8	100.0	120	19.8 25.1 7.9		**SILTY SAND (SM)** Gray, wet, dense, fine grained, trace shell pieces. -color change to tan, partially cemented sand with shell pieces. -medium dense. -some clay content.		
100	RS-9	100.0 110.0	120	6.5 6.1 14.6		**WELL GRADED SAND (SW)** Tan, Coarse grained, some snd clasts and shell pieces. **SILTY SAND (SM)** Tan/white, partially cemented sand with abundant shell fragments. **SILTY SAND (SM)** Tan, medium dense, fine grained, some shell fragments. **SAND (SP)** Olive gray, wet, medium dense, fine grained.		
105								
110						End of Boring Log at 110' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
115								
120								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW117-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286515.24, 3839648.89 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 14.57 ft BTOC (5/24/2012) START: 4/1/2012 END: 4/1/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				**SILTY SAND (SM)** Light brown to tan, loose, fine grained, roots present.		
	HA-1		60	NM				
5		5.0						
		5.0				**SILTY SAND (SM)** Tan/yellow-orange, dry, medium dense to loose, fine grained.		
	RS-1		60	0		-damp @ 9ft.		
10		10.0				-wet @ 10ft.		
		10.0				**SAND (SP)** Tan, wet, loose, fine grained.		
						-color change to very light gray.		
15	RS-2		120	0				
20		20.0						
		20.0				-color change to tan.		
				0.3				
						-medium grained.		
25	RS-3		120	0.5				
				0.2		**SILTY SAND (SM)** Tan, wet, medium dense, fine grained, trace clay.		
						SAND (SP) Tan, wet, loose, fine grained.		
30		30.0				**SILTY SAND (SM)** Tan, medium dense, fine grained, trace clay.		
				0.3				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW117-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286515.24, 3839648.89 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 14.57 ft BTOC (5/24/2012) START: 4/1/2012 END: 4/1/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		30.0				**SAND (SP)** Light tan, wet, loose, fine grained.		
35	RS-4		120	0				
				0				
40		40.0						
		40.0				-color change to tan/yellow-orange.		
				0				
45	RS-5		120					
				0.2				
50		50.0						
		50.0				-color change to yellow-orange.		
				0.3				
55	RS-6		120	3.7		**SILTY SAND (SM)** Dark gray, wet, medium dense, fine grained, trace clay. -increasing clay content.		
				9.2				
60		60.0				**CLAYEY SAND (SC)** Light gray, stiff, partially cemented sand with shells. (soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW117-UCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286515.24, 3839648.89 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 14.57 ft BTOC (5/24/2012) START: 4/1/2012 END: 4/1/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						SAND (SP) Brown.		
						End of Boring Log at 60' bgs		
						Abbreviations:		
						bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
65								
70								
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW121-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.10 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285721.53, 3838498.47 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.86 ft BTOC (4/5/2012) START: 3/30/2012 END: 3/30/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				-asphalt.		
	HA-1		60	NM		**SILTY SAND (SM)** Light brown to tan.		
5		5.0						
		5.0				**SILTY SAND (SM)** Tan/brown/yellow-orange, dry, loose, fine grained.		
	RS-1		36	0		-moist.		
10		10.0						
		10.0		0		**SANDY CLAY (CL)** Gray, moist, soft, low plasticity, 10-15% fine grained sand.		
				0.5		**CLAY (CL)** Gray, moist, very soft, medium plasticity, trace fine grained sand.		
15	RS-2		120					
				4.1		**SANDY CLAY (CL)** Gray, moist, very soft, low plasticity, 10-15% fine grained sand.		
				5.4		**CLAYEY SAND (SC)** Dark gray, moist, soft, fine to medium grained.		
20		20.0						
		20.0		0.9		**SAND (SP)** Light gray, loose, fine grained.		
						SILTY SAND (SM) Tan/light gray, wet, medium dense, partially cemented, abundant fossils and shell pieces.		
25				5.9				
				0				
30	RS-3		240	0				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW121-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.10 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285721.53, 3838498.47 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.86 ft BTOC (4/5/2012) START: 3/30/2012 END: 3/30/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35				0		**SILTY SAND (SM)** Yellow-orange, wet, loose, fine grained, trace cemented sand fragments, some shell fragments.		
				0		-tan, increased cemented sand fragments.		
40		40.0						
		40.0		0.6		**SAND (SP)** Tan/yellow-orange, wet, loose, fine grained, trace shell fragments.		
45				0.6				
50	RS-4		240	2.4		**SILTY SAND (SM)** Yellow-orange, wet, medium dense, partially cemented, abundant shell fragments.		
				4.2		**SILTY SAND (SM)** Gray, wet, medium dense, fine grained, some shells and partially cemented sand fragments.		
55				8.2		-increasing amount and size of shells and pieces.		
				16.8		**SILTY SAND (SM)** Light gray, wet, medium dense, fine grained. -limestone pieces with sand.		
60		60.0				(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW121-UCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.10 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285721.53, 3838498.47 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.86 ft BTOC (4/5/2012) START: 3/30/2012 END: 3/30/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
65								
70								
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW122-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.98 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285729.38, 3838510.93 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.76 ft BTOC (5/25/2012) START: 4/14/2012 END: 4/14/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				-asphalt.		
	HA-1		60	NM		**SILTY SAND (SM)** Light brown to tan.	Lithology from 0-40 ft bgs taken from IR78GW121-UCH	
5		5.0						
		5.0				**SILTY SAND (SM)** Tan/brown/yellow-orange, dry, loose, fine grained.		
	NM		NM	NM				
10		10.0				-moist.		
		10.0				**SANDY CLAY (CL)** Gray, moist, soft, low plasticity, 10-15% fine grained sand.		
						CLAY (CL) Gray, moist, very soft, medium plasticity, trace fine grained sand.		
15	NM		NM	NM				
						SANDY CLAY (CL) Gray, moist, very soft, low plasticity, 10-15% fine grained sand.		
						CLAYEY SAND (SC) Dark gray, moist, soft, fine to medium grained.		
20		20.0						
		20.0				**SAND (SP)** Light gray, loose, fine grained.		
						SILTY SAND (SM) Tan/light gray, wet, medium dense, partially cemented, abundant fossils and shell pieces.		
25								
30	NM		NM	NM				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW122-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.98 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285729.38, 3838510.93 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.76 ft BTOC (5/25/2012) START: 4/14/2012 END: 4/14/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35						**SILTY SAND (SM)** Yellow-orange, wet, loose, fine grained, trace cemented sand fragments, some shell fragments.		
						-tan, increased cemented sand fragments.		
40		40.0						
		40.0		NM		**WELL GRADED GRAVEL (GW)** Dark gray, wet, well graded gravel with fossilferous limestone and consolidated pieces up to 60mm.		
						SAND (SP) Yellowish brown, wet, low density, fine grained sand with silt, shell fragments.		
45				0				
						WELL GRADED SAND (SW) Orange-brown, wet, medium dense, sand with fossilferous limestone and cemented sand up to 30mm.		
50	RS-1		225.6	0.1				
				0.2		**SILTY SAND WITH GRAVEL (SM/GW)** Light to medium gray, wet, low to medium dense, fine grained sand with silt, shell fragments and cemented sand clasts up to 30mm.		
				0.3				
55				0.5				
				0.1				
				0.2				
				0.4		-color change to light gray, fossilferous limestone up to 50mm.		
				0.2		-color change to dark gray.		
60		60.0						
				0.8		(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW122-UCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.98 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285729.38, 3838510.93 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.76 ft BTOC (5/25/2012) START: 4/14/2012 END: 4/14/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
65								
70								
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW123-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.98 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285736.10, 3838508.95 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.7 ft BTOC (5/25/2012) START: 4/13/2012 END: 4/13/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				-asphalt.		
	HA-1		60	NM		**SILTY SAND (SM)** Light brown to tan.	Lithology from 0-40 ft bgs taken from IR78GW121-UCH	
5		5.0						
	NM	5.0	NM	NM		**SILTY SAND (SM)** Tan/brown/yellow-orange, dry, loose, fine grained. -moist.		
10		10.0						
	NM	10.0	NM	NM		**SANDY CLAY (CL)** Gray, moist, soft, low plasticity, 10-15% fine grained sand.		
15						**CLAY (CL)** Gray, moist, very soft, medium plasticity, trace fine grained sand.		
						SANDY CLAY (CL) Gray, moist, very soft, low plasticity, 10-15% fine grained sand.		
20		20.0				**CLAYEY SAND (SC)** Dark gray, moist, soft, fine to medium grained.		
		20.0				**SAND (SP)** Light gray, loose, fine grained.		
25						**SILTY SAND (SM)** Tan/light gray, wet, medium dense, partially cemented, abundant fossils and shell pieces.		
30	NM		NM	NM				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW123-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.98 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285736.10, 3838508.95 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.7 ft BTOC (5/25/2012) START: 4/13/2012 END: 4/13/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35						**SILTY SAND (SM)** Yellow-orange, wet, loose, fine grained, trace cemented sand fragments, some shell fragments.		
						-tan, increased cemented sand fragments.		
40		40.0						
		40.0				**WELL GRADED SAND (SW)** Dark gray, wet, loose, fossilferous limestone fragments.		
				0		**SAND (SP)** Yellowish brown, wet, low density, fine grained sand with silt, shell fragments.		
45								
				0		**WELL GRADED SAND (SW)** Orange-brown, wet, medium dense, coarse grained, fossilferous limestone and cemented sand fragments up to 40mm.		
50	RS-1		238.8					
				0.3		**SILTY SAND WITH GRAVEL (SM/GW)** Gray, wet, low density to loose, fine grained sand with silt, shell fragments and cemented sand fragments up to 30mm.		
55				0.2				
				1		-color change to light gray.		
60		60.0						
						(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW123-UCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.98 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285736.10, 3838508.95 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.7 ft BTOC (5/25/2012) START: 4/13/2012 END: 4/13/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
65								
70								
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW124-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.97 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285739.74, 3838510.02 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.78 ft BTOC (5/25/2012) START: 4/14/2012 END: 4/14/2012 LOGGER : K.Schrecengost/BOS

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				-asphalt.		
	HA-1		60	NM		**SILTY SAND (SM)** Light brown to tan.	Lithology from 0-40 ft bgs taken from IR78GW121-UCH	
5		5.0						
		5.0				**SILTY SAND (SM)** Tan/brown/yellow-orange, dry, loose, fine grained.		
	NM		NM	NM				
10		10.0				-moist.		
		10.0				**SANDY CLAY (CL)** Gray, moist, soft, low plasticity, 10-15% fine grained sand.		
						CLAY (CL) Gray, moist, very soft, medium plasticity, trace fine grained sand.		
15	NM		NM	NM				
						SANDY CLAY (CL) Gray, moist, very soft, low plasticity, 10-15% fine grained sand.		
						CLAYEY SAND (SC) Dark gray, moist, soft, fine to medium grained.		
20		20.0						
		20.0				**SAND (SP)** Light gray, loose, fine grained.		
						SILTY SAND (SM) Tan/light gray, wet, medium dense, partially cemented, abundant fossils and shell pieces.		
25								
30	NM		NM	NM				

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW124-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.97 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285739.74, 3838510.02 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.78 ft BTOC (5/25/2012) START: 4/14/2012 END: 4/14/2012 LOGGER : K.Schrecengost/BOS

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35						**SILTY SAND (SM)** Yellow-orange, wet, loose, fine grained, trace cemented sand fragments, some shell fragments.		
						-tan, increased cemented sand fragments.		
40		40.0						
	RS-1	40.0 45.0	54	0		**SAND (SP)** Orange-tan, moist, medium dense, fine to very fine grained, shell fragments, increasing grain size of shell fragments.		
45						-color change to tan-light brown.		
	RS-2	45.0 50.0	50.4	0		**WELL GRADED SAND (SW)** Orange, moist, loose, medium to very fine grained, partially cemented, 1.5-inch cemented clasts and shell fragments.		
50						**SILTY SAND (SM)**		
	RS-3	50.0 55.0	51.6	0.2 0 0.3		Light gray, moist, medium dense, fine to very fine grained, lightly cemented, trace shell fragments, silt content increasing with depth, increasing cementation and shell fragments with depth. -color change to gray, increasing cementation and shell clasts (~2-inches).		
55								
	RS-4	55.0 60.0	56.4	1.9 0.7		-color change to light gray, increasing cementation and shell clasts (~3-inches).		
60				0.2		-color change to gray, decreasing cementation and shell clasts (~0.5-inches).		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW124-UCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 7.97 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285739.74, 3838510.02 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 16.78 ft BTOC (5/25/2012) START: 4/14/2012 END: 4/14/2012 LOGGER : K.Schrecengost/BOS

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
65								
70								
75								
80								
85								
90								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW125-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.41 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286427.70, 3839627.49 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.59 ft BTOC (5/25/2012) START: 4/10/2012 END: 4/10/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				**SILTY SAND (SM)** Dark gray, dry, loose.		
	HA-1		60	NM			Lithology from 0-70 ft bgs taken from IR78GW116-MCH	
5		5.0						
		5.0				**SANDY SILT (ML)** Dark gray/tan, dry, loose, fine grained, organic, trace roots.		
	RS-1		60	NM				
10		10.0				**SILTY SAND (SM)** Tan/yellow-orange, dry, loose, fine grained.		
		10.0				**SAND (SP)** Tan, moist, loose, fine grained.		
						SILTY SAND (SM) Yellow-orange, moist, loose, fine grained.		
15	NM		NM	NM				
						SAND (SP) Tan, moist/wet, loose, fine grained. -color change to light gray.		
						SANDY CLAY (CL) Light gray, damp, stiff, fine grained sand, low plasticity.		
20		20.0						
		20.0				**SANDY SILTY CLAY (CL)** Light gray, moist, soft, fine grained.		
						SILTY SAND (SM) Tan, wet, loose, fine grained.		
25								
						SAND (SP) Light tan, wet, loose, fine grained. -sandy clay lens @ 27ft.		
30	NM		NM	NM				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW125-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.41 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286427.70, 3839627.49 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.59 ft BTOC (5/25/2012) START: 4/10/2012 END: 4/10/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35						**SAND (SP)** Light tan, wet, loose, fine grained.		
40		40.0						
		40.0						
45								
						SILTY SAND (SM) Tan/yellow-orange, wet, loose, fine grained.		
50	NM		NM	NM		**SAND (SP)** Yellow-orange, wet, loose, fine grained.		
						SILTY SAND (SM) Yellow-orange, fine grained.		
55						**SANDY SILT (ML)** Tan, dry, dense, fine grained. -color change to dark gray.		
60		60.0				**SILTY SAND (SM)** Tan/yellow-orange/gray, damp, loose, fine grained.		
		60.0				(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW125-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.41 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286427.70, 3839627.49 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.59 ft BTOC (5/25/2012) START: 4/10/2012 END: 4/10/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
65	NM		NM	NM		**SAND (SP)** Tan, wet, loose, fine grained.		
70		70.0						
		70.0		0.8		**SAND (SP)** Grayish brown, wet, medium dense, very fine grained, sand with some silt.		
				0.3				
75				0.3		**SILTY SAND (SM)** Gray/reddish brown, wet, medium dense, very fine grained, sand with some silt and shell fragments and gravel to 20mm. -color change to medium gray.		
				0.3				
				0.3				
80	RS-1		213.6	2.3				
				1.3				
				2.9				
85				0.9				
				1.8		-color change to dark gray, damp.		
90		90.0						
				2.3		(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW125-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.41 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286427.70, 3839627.49 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.59 ft BTOC (5/25/2012) START: 4/10/2012 END: 4/10/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 90' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
95								
100								
105								
110								
115								
120								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:	
423783.FI.WI	IR78GW126-MCH	SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.26 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286434.48, 3839631.45 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/4/2012 END: 4/4/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
	HA-1	0.0 – 5.0	60	NM		**SILTY SAND (SM)** Dark gray, dry, loose.	Lithology from 0-70 ft bgs taken from IR78GW116-MCH	
5	RS-1	5.0 – 10.0	60	NM		**SANDY SILT (ML)** Dark gray/tan, dry, loose, fine grained, organic, trace roots.		
10	NM	10.0 – 20.0	NM	NM		**SILTY SAND (SM)** Tan/yellow-orange, dry, loose, fine grained.		
						SAND (SP) Tan, moist, loose, fine grained.		
15						**SILTY SAND (SM)** Yellow-orange, moist, loose, fine grained.		
						SAND (SP) Tan, moist/wet, loose, fine grained. -color change to light gray.		
20						**SANDY CLAY (CL)** Light gray, damp, stiff, fine grained sand, low plasticity.		
						SANDY SILTY CLAY (CL) Light gray, moist, soft, fine grained.		
25						**SILTY SAND (SM)** Tan, wet, loose, fine grained.		
						SAND (SP) Light tan, wet, loose, fine grained. -sandy clay lens @ 27ft.		
30	NM		NM	NM				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW126-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.26 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286434.48, 3839631.45 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/4/2012 END: 4/4/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35						**SAND (SP)** Light tan, wet, loose, fine grained.		
40		40.0						
		40.0						
45						**SILTY SAND (SM)** Tan/yellow-orange, wet, loose, fine grained.		
50	NM		NM	NM		**SAND (SP)** Yellow-orange, wet, loose, fine grained.		
55						**SILTY SAND (SM)** Yellow-orange, fine grained.		
						SANDY SILT (ML) Tan, dry, dense, fine grained. -color change to dark gray.		
60		60.0				**SILTY SAND (SM)** Tan/yellow-orange/gray, damp, loose, fine grained.		
		60.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW126-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.26 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286434.48, 3839631.45 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/4/2012 END: 4/4/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
65	NM		NM	NM		**SAND (SP)** Tan, wet, loose, fine grained.		
70		70.0						
	RS-1	70.0 75.0	60	0.7 1.1		**SAND (SP)** Tan, wet, loose, medium grained.		
75	RS-2	75.0 80.0	60	2.2 5.7		**SILTY SAND (SM)** Tan, wet, loose, fine grained. -trace shell fragments. -color change to gray, medium dense, trace shell fragments.		
80	RS-3	80.0 85.0	60	4.2 6.7				
85	RS-4	85.0 90.0	60	9.5 9.4		-color change to dark gray.		
90						(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW126-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.26 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286434.48, 3839631.45 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/4/2012 END: 4/4/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 90' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
95								
100								
105								
110								
115								
120								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW127-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.29 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286436.81, 3839631.96 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/3/2012 END: 4/3/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
0	HA-1	0.0 – 5.0	60	NM		**SILTY SAND (SM)** Dark gray, dry, loose.	Lithology from 0-70 ft bgs taken from IR78GW116-MCH	
5	NM	5.0 – 10.0	NM	NM		**SANDY SILT (ML)** Dark gray/tan, dry, loose, fine grained, organic, trace roots.		
10	NM	10.0 – 20.0	NM	NM		**SILTY SAND (SM)** Tan/yellow-orange, dry, loose, fine grained. **SAND (SP)** Tan, moist, loose, fine grained. **SILTY SAND (SM)** Yellow-orange, moist, loose, fine grained. **SAND (SP)** Tan, moist/wet, loose, fine grained. -color change to light gray.		
20	NM	20.0 – 30.0	NM	NM		**SANDY CLAY (CL)** Light gray, damp, stiff, fine grained sand, low plasticity. **SANDY SILTY CLAY (CL)** Light gray, moist, soft, fine grained. **SILTY SAND (SM)** Tan, wet, loose, fine grained. **SAND (SP)** Light tan, wet, loose, fine grained. -sandy clay lens @ 27ft.		
30	NM		NM	NM				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW127-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.29 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286436.81, 3839631.96 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/3/2012 END: 4/3/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35						**SAND (SP)** Light tan, wet, loose, fine grained.		
40		40.0						
		40.0						
45								
						SILTY SAND (SM) Tan/yellow-orange, wet, loose, fine grained.		
50	NM		NM	NM		**SAND (SP)** Yellow-orange, wet, loose, fine grained.		
						SILTY SAND (SM) Yellow-orange, fine grained.		
55						**SANDY SILT (ML)** Tan, dry, dense, fine grained. -color change to dark gray.		
60		60.0				**SILTY SAND (SM)** Tan/yellow-orange/gray, damp, loose, fine grained.		
		60.0				(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW127-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.29 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286436.81, 3839631.96 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/3/2012 END: 4/3/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
65	NM		NM	NM		**SAND (SP)** Tan, wet, loose, fine grained.		
70		70.0						
	RS-1	70.0 75.0	60	2.2 2.5		**SAND (SP)** Tan, wet, medium dense, fine grained, trace shell fragments.		
75	RS-2	75.0 80.0	60	4.8 6.2		**SILTY SAND (SM)** Tan, wet, medium dense, fine grained, trace shell fragments. -color change to gray.		
80	RS-3	80.0 85.0	60	12.1 7.1		**SAND (SP)** Gray, wet, loose to medium dense, fine grained, trace shell fragments.		
85	RS-4	85.0 90.0	60	6.7 20.1				
90						(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW127-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.29 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 286436.81, 3839631.96 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 15.71 ft BTOC (5/25/2012) START: 4/3/2012 END: 4/3/2012 LOGGER : B.Propst/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 90' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
95								
100								
105								
110								
115								
120								

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW128-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.10 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285722.48, 3838497.25 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 17.03 ft BTOC (5/25/2012) START: 4/19/2012 END: 4/19/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				-asphalt.		
	HA-1		60	NM		**SAND (SP)** Light brown, dry to moist, loose, fine grained.	Lithology from 0-90 ft bgs taken from IR78GW129-LCH	
5		5.0				-color change to light gray.		
		5.0				**CLAY (CL)** Dark gray.		
	NM		NM	NM		No Recovery.		
						SILTY SAND (SM) Light gray mottled with dark orange, moist, loose, fine grained, poorly graded sand.		
10		10.0				-wet, some clay presnet.		
		10.0				**SANDY CLAY (CL)** Gray, moist, soft, low plasticity, cohesive, sticky, 5-10% silt.		
15	NM		NM	NM				
20		20.0						
		20.0				**CLAYEY SAND (SC)** Gray, moist, loose, low plasticity, cohesive, sticky, 50% sand.		
						SILTY SAND (SM) Light orange mottled with light gray, wet, medium dense, fine grained sand, partially to weakly cemented with shells.		
25	NM		NM	NM				
30		30.0				(soil description on next page)		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW128-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.10 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285722.48, 3838497.25 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 17.03 ft BTOC (5/25/2012) START: 4/19/2012 END: 4/19/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		30.0				-highly cemented with cobble sized nodules of cemented sand and shells.		
35	NM		NM	NM		**SILTY SAND (SM)** Light orange mottled with light gray, wet, medium dense, fine grained sand, partially to weakly cemented with shells.		
						No Recovery.		
40		40.0						
		40.0				**SAND (SP)** Light orange mottled with light gray, wet, medium dense, fine grained, abundant shells, trace nodules of cemented sand.		
45	NM		NM	NM				
50		50.0				**SILTY SAND (SM)** Dark orange, wet, dense, fine grained, highly cemented, abundant shells up to 2cm. -color change to gray, almost fully lithified.		
		50.0						
55	NM		NM	NM				
60		60.0						
		60.0				No Recovery.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW128-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.10 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285722.48, 3838497.25 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 17.03 ft BTOC (5/25/2012) START: 4/19/2012 END: 4/19/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						No Recovery.		
65	NM		NM	NM		**SAND (SP)** Gray, moist, loose, fine grained, trace shell fragments.		
70		70.0						
	NM	70.0	NM	NM		-wet.		
75								
	NM		NM	NM				
80		80.0						
	NM	80.0	NM	NM		**SILTY SAND (SM)** Gray, wet, medium dense, poorly graded, cohesive, 15-20% silt, trace shell fragments.		
85								
	NM		NM	NM		-color change to light gray, gravel sized cemented sand nodules and shells.		
90		90.0						
		90.0		0		(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW128-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.10 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285722.48, 3838497.25 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2

WATER LEVEL: 17.03 ft BTOC (5/25/2012) START: 4/19/2012 END: 4/19/2012 LOGGER : S.Kline/ATL

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
				0		**SILTY SAND (SM)** Dark gray, moist, medium dense, fine grained sand with silt, gravel and clasts up to 30mm.		
95				0		**WELL GRADED SAND WITH GRAVEL (SW/GW)** Light gray, wet.		
				0		**SILTY SAND (SM)** Medium gray, moist, medium dense, fine grained sand with silt, gravel and clasts up to 30mm.		
	RS-1		174	0		**SAND (SP)** Medium gray, moist, low density, fine grained sand with silt, shell fragments present.		
100				0		-decreasing silt content.		
				0				
105		105.0		0		End of Boring Log at 105' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
110								
115								
120								

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW129-LCH SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.19 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2, 6" casing

WATER LEVEL: 15.4 ft BTOC (5/25/2012) START: 11/12/2012 END: 11/12/2012 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		0.0				-asphalt.		
	HA-1		60	NM		**SAND (SP)** Light brown, dry to moist, loose, fine grained.		
5		5.0				-color change to light gray.		
		5.0				**CLAY (CL)** Dark gray.		
						No Recovery.		
	RS-1		36	0.4		**SILTY SAND (SM)** Light gray mottled with dark orange, moist, loose, fine grained, poorly graded sand.		
10		10.0						
		10.0		0.9		-wet, some clay presnet.		
						SANDY CLAY (CL) Gray, moist, soft, low plasticity, cohesive, sticky, 5-10% silt.		
15	RS-2		120	0				
20		20.0						
		20.0		1.2		**CLAYEY SAND (SC)** Gray, moist, loose, low plasticity, cohesive, sticky, 50% sand.		
				2.4		**SILTY SAND (SM)** Light orange mottled with light gray, wet, medium dense, fine grained sand, partially to weakly cemented sand with shells.		
25	RS-3		102	1.5				
				3.4				
30		30.0						
				3.4		(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW129-LCH SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.19 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2, 6" casing

WATER LEVEL: 15.4 ft BTOC (5/25/2012) START: 11/12/2012 END: 11/12/2012 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
		30.0				-highly cemented with cobble sized nodules of cemented sand and shells.		
				1.5		**SILTY SAND (SM)** Light orange mottled with light gray, wet, medium dense, fine grained sand, partially to weakly cemented sand with shells.		
35	RS-4		90	1.1				
				5.5		No Recovery.		
40		40.0						
		40.0		6.4				
				7.8		**SAND (SP)** Light orange mottled with light gray, wet, medium dense, fine grained, abundant shells, trace nodules of cemented sand.		
45	RS-5		96	12				
				10.1				
50		50.0				**SILTY SAND (SM)** Dark orange, wet, dense, fine grained, highly cemented, abundant shells up to 2cm. -color change to gray, almost fully lithified.		
		50.0		11.5				
				2.7				
55	RS-6		120	4.3				
				1.1				
60		60.0						
		60.0		0.9		No Recovery.		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW129-LCH SHEET 3 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.19 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2, 6" casing

WATER LEVEL: 15.4 ft BTOC (5/25/2012) START: 11/12/2012 END: 11/12/2012 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						No Recovery.		
				1.1		**SAND (SP)** Gray, moist, loose, fine grained, trace shell fragments.		
65	RS-7		96	0				
				0				
70		70.0						
		70.0		0		-wet.		
				64.6				
75	RS-8		120	85.7				
				73.8				
80		80.0						
		80.0		18.1			8-in temporary casing installed to 50 ft bgs	
				44		**SILTY SAND (SM)** Gray, wet, medium dense, poorly graded, cohesive, 15-20% silt, trace shell fragments.		
85	RS-9		120	57.1				
				24.9		-color change to light gray, gravel sized cemented sand nodules and shells.		
90		90.0						
		90.0		422				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW129-LCH SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.19 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2, 6" casing

WATER LEVEL: 15.4 ft BTOC (5/25/2012) START: 11/12/2012 END: 11/12/2012 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
				169				
95	RS-10		120	222		**SAND (SP)** Light gray, wet, loose, fine grained, 5-10% silt, trace shell fragments.		
				1385				
100		100.0						
		100.0		1312		-decrease in fine (<5%), increase in shell fragments to few, medium grained.		
				786				
105	RS-11		120	89.1				
				22.5				
110		110.0						
		110.0		0.9				
				0				
115	RS-12		120	0				
				1.2				
120		120.0						
		120.0		0.8				

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW129-LCH SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.19 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters) : 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2, 6" casing

WATER LEVEL: 15.4 ft BTOC (5/25/2012) START: 11/12/2012 END: 11/12/2012 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
125	RS-13	130.0	120	0.8 1.6 1.8		**SILTY SAND (SM)** Gray, wet, medium dense, fine grained, 15-20% silt, cohesive, trace shell fragments.		
130		130.0		1		No Recovery.		
135	RS-14	140.0	60	0.5 0.3		**SAND (SP)** Gray, wet, loose, medium grained, <5% silt, trace shell fragments.		
140		140.0		0.8				
145	RS-15	150.0	0	1 1.1 1		**SILTY SAND (SM)** Gray, wet, medium dense, fine grained, 15-20% silt, poorly graded, trace shell fragments.		
150				1.1		(soil description on next page)		

PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW129-LCH SHEET 6 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT : Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 8.19 ft above sea level DRILLING CONTRACTOR : Drill Pro

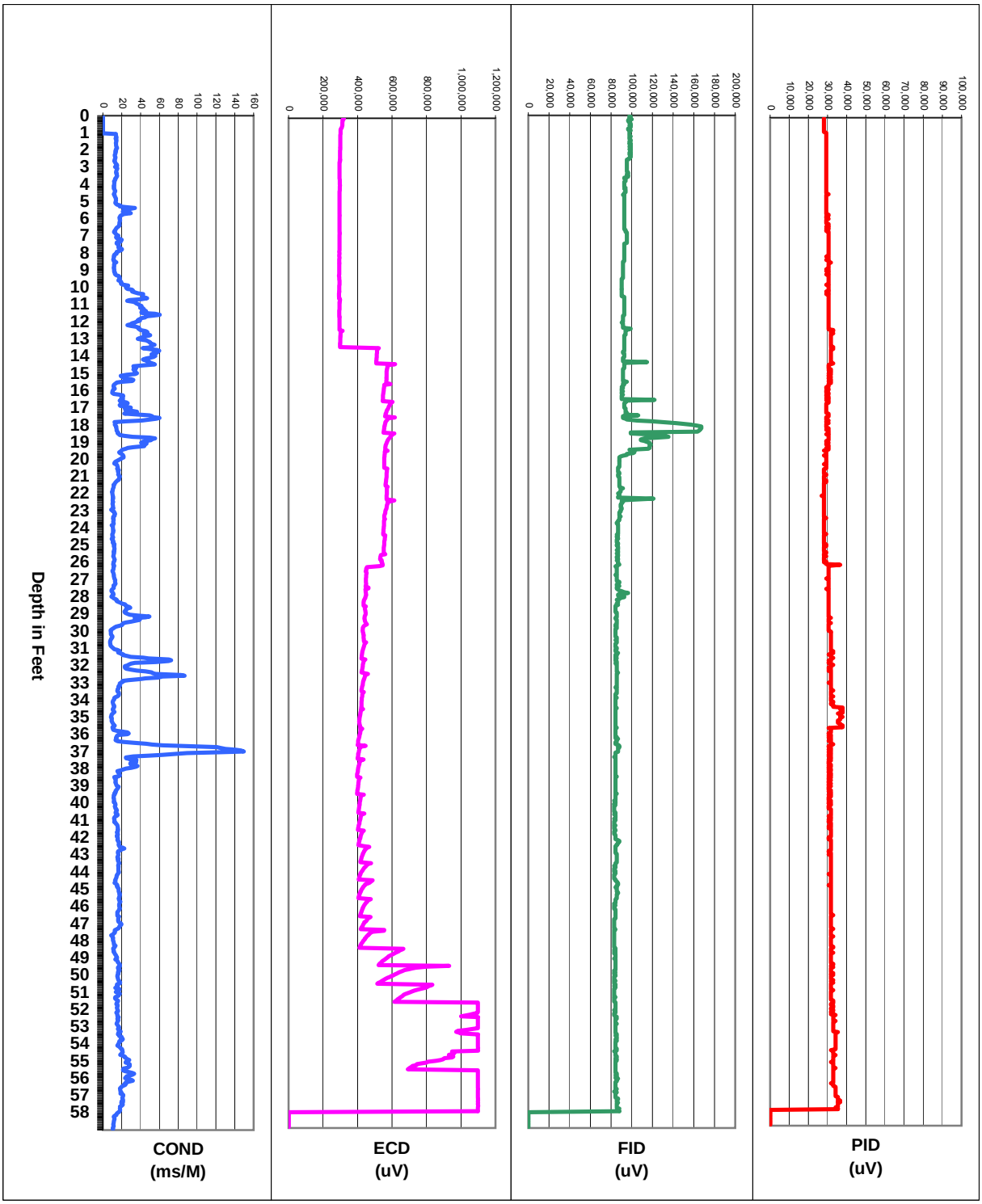
EAST, NORTH (UTM Z18 NAD83, meters) : 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT : Roto Sonic SR-2, 6" casing

WATER LEVEL: 15.4 ft BTOC (5/25/2012) START: 11/12/2012 END: 11/12/2012 LOGGER : A.Guilfoyle/CLT

DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 150' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run		
155								
160								
165								
170								
175								
180								

Attachment B
MIP Logs

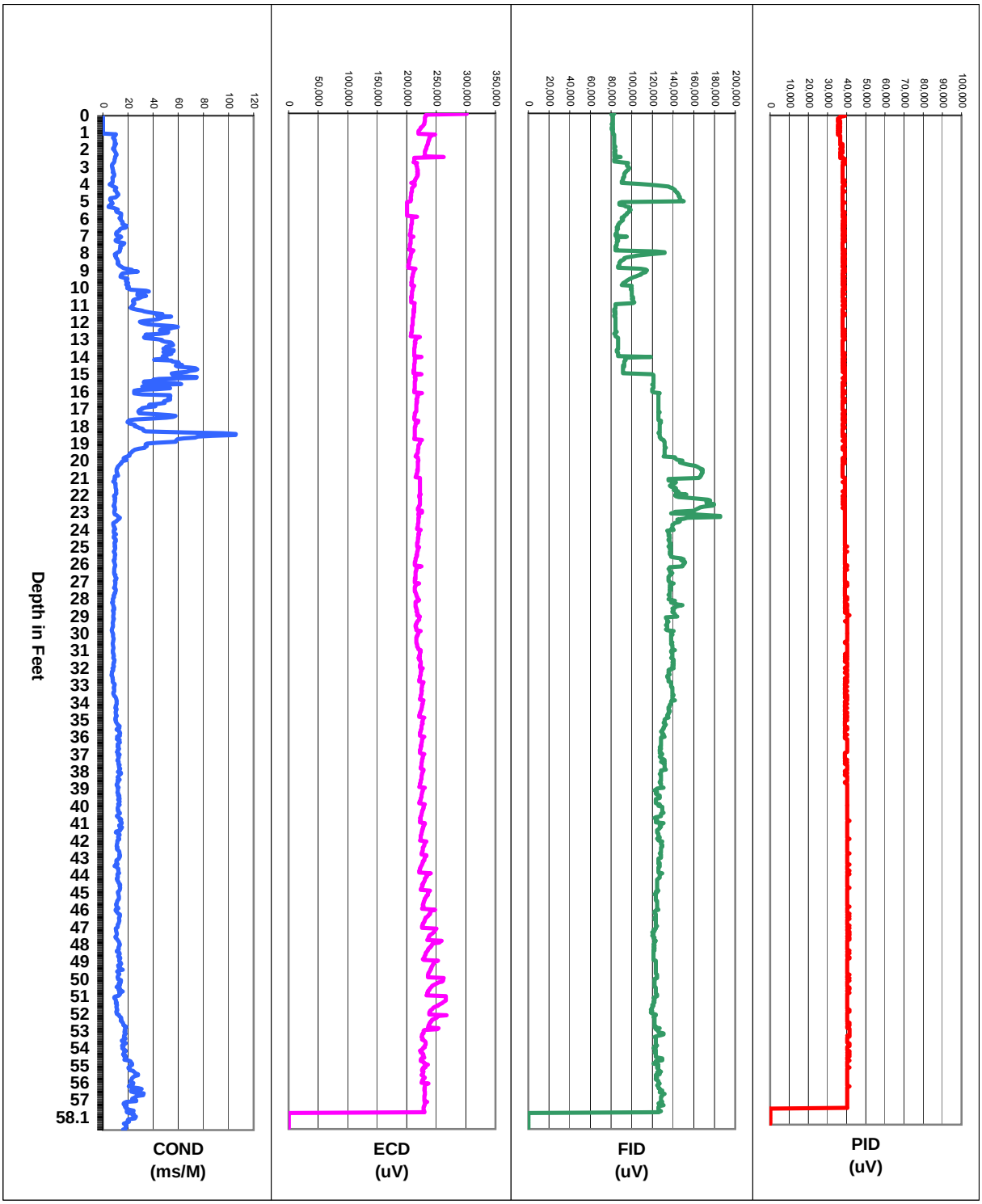
ZEBRA EC/MIP Summary Log, Point CHMIP1
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/11/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 1 of 0

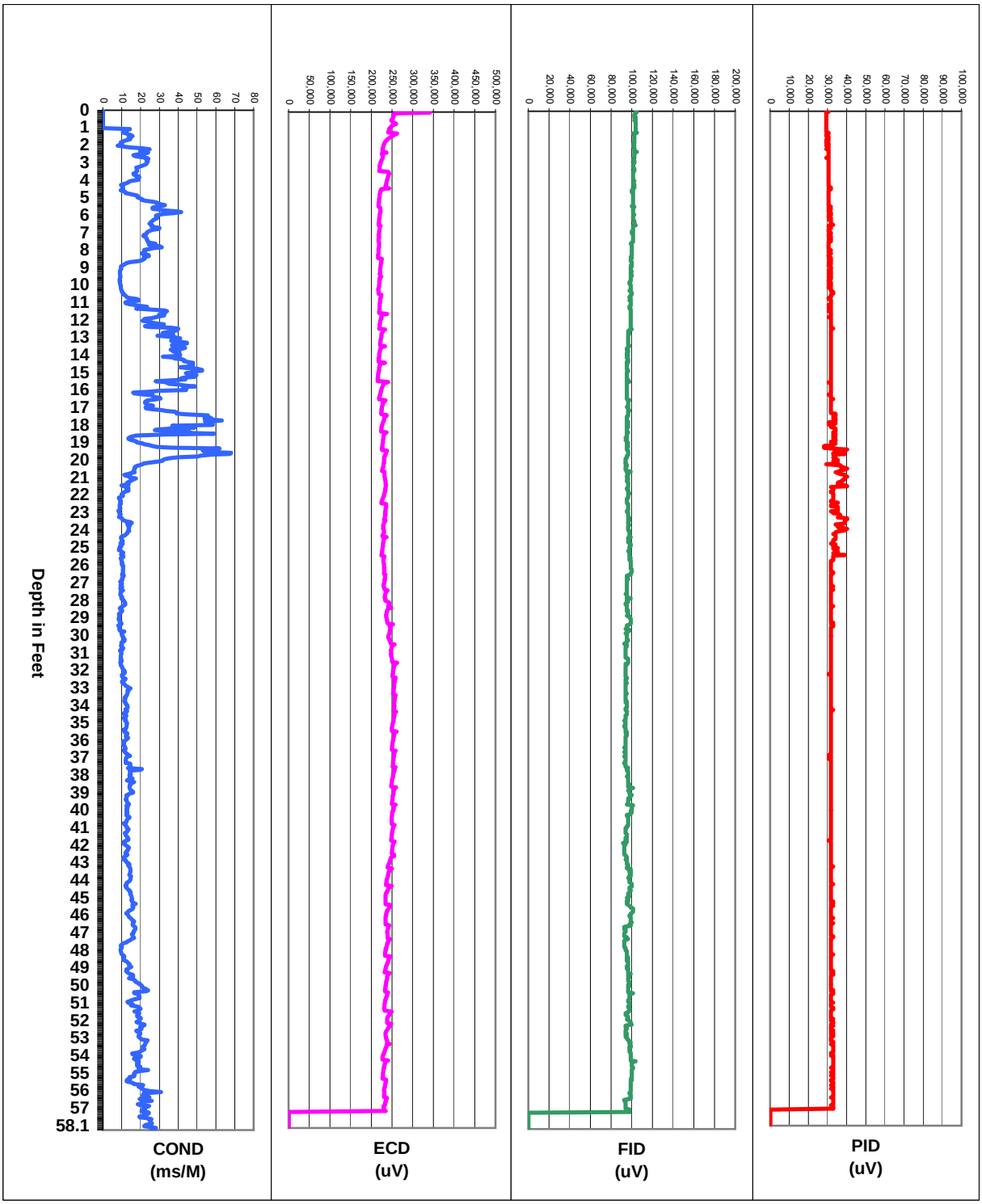
ZEBRA EC/MIP Summary Log, Point CHMIP2
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/11/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 2 of 0

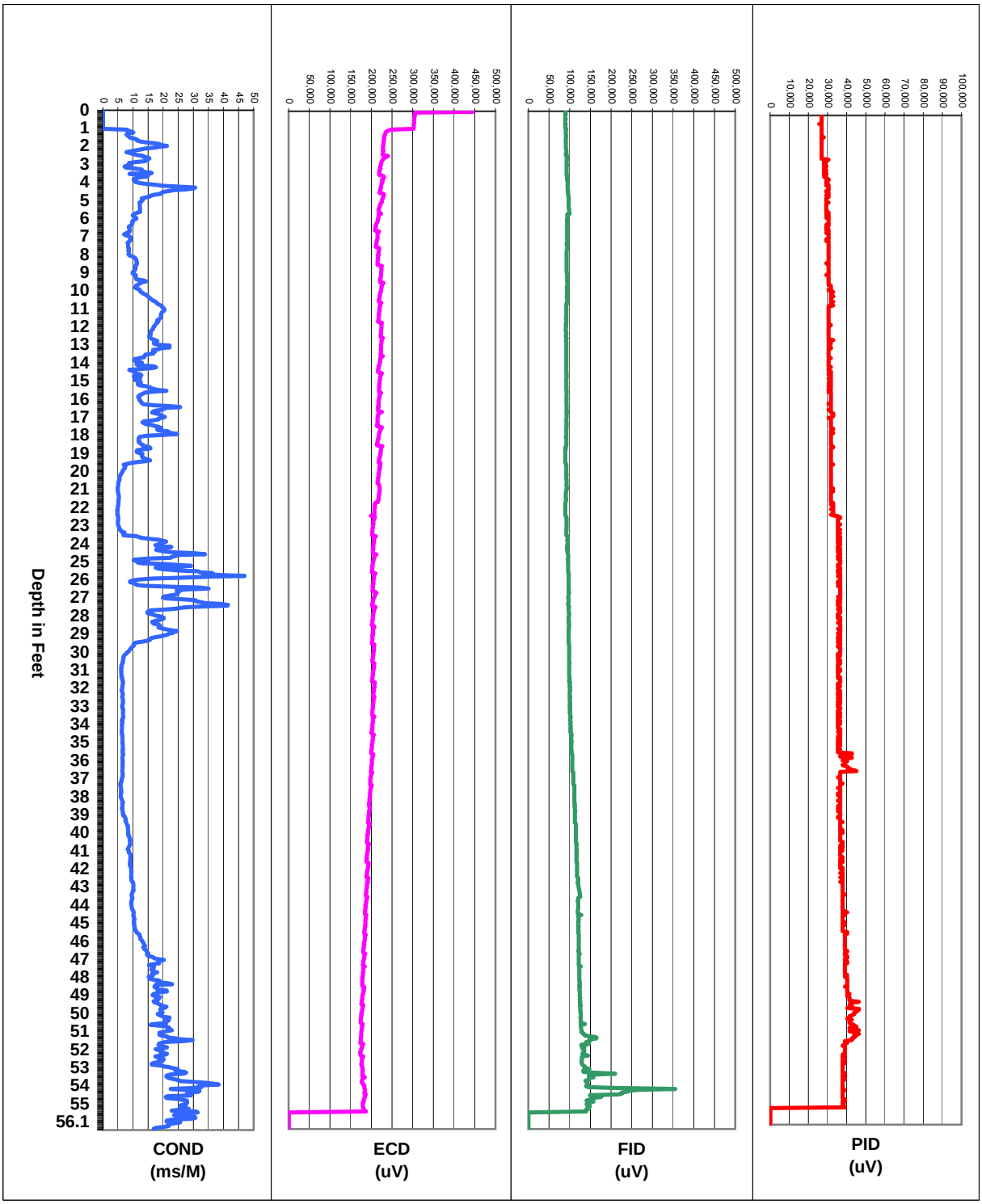
ZEBRA EC/MIP Summary Log, Point CHMIP3
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/12/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 3 of 0

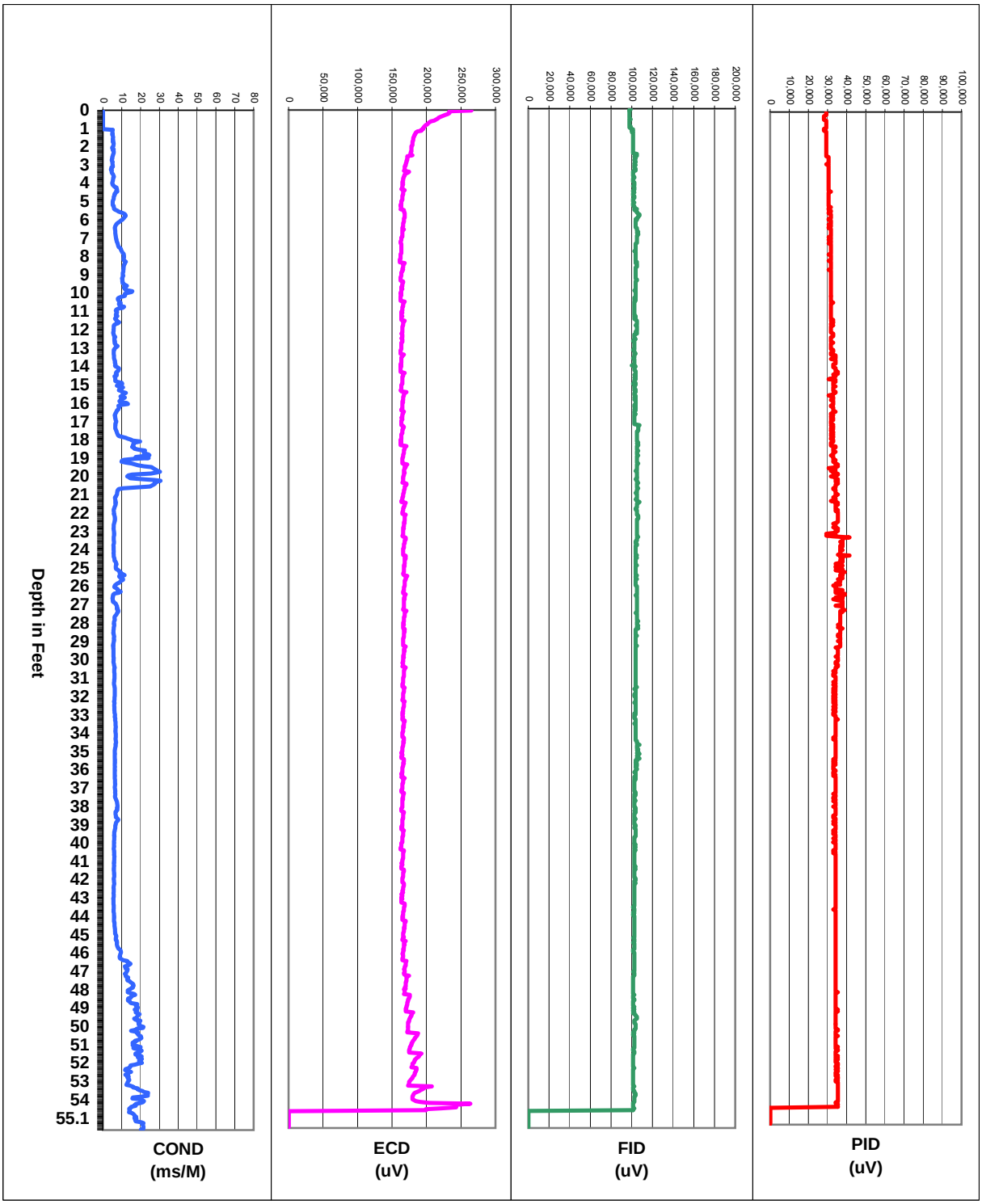
ZEBRA EC/MIP Summary Log, Point CHMIP4
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/12/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 4 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP5
Jacksonville, NC

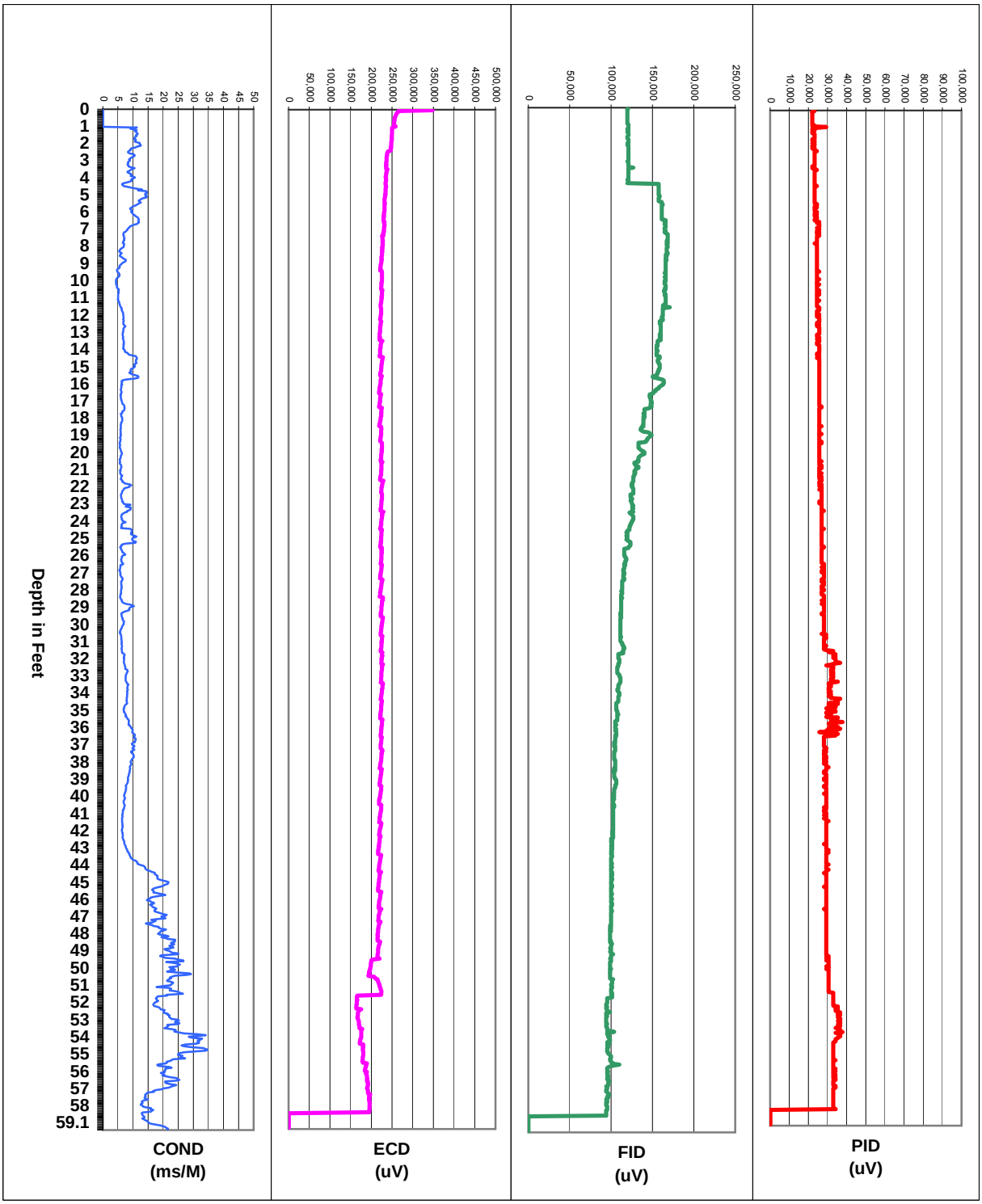


ZEBRA

for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 4/25/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 5 of 0

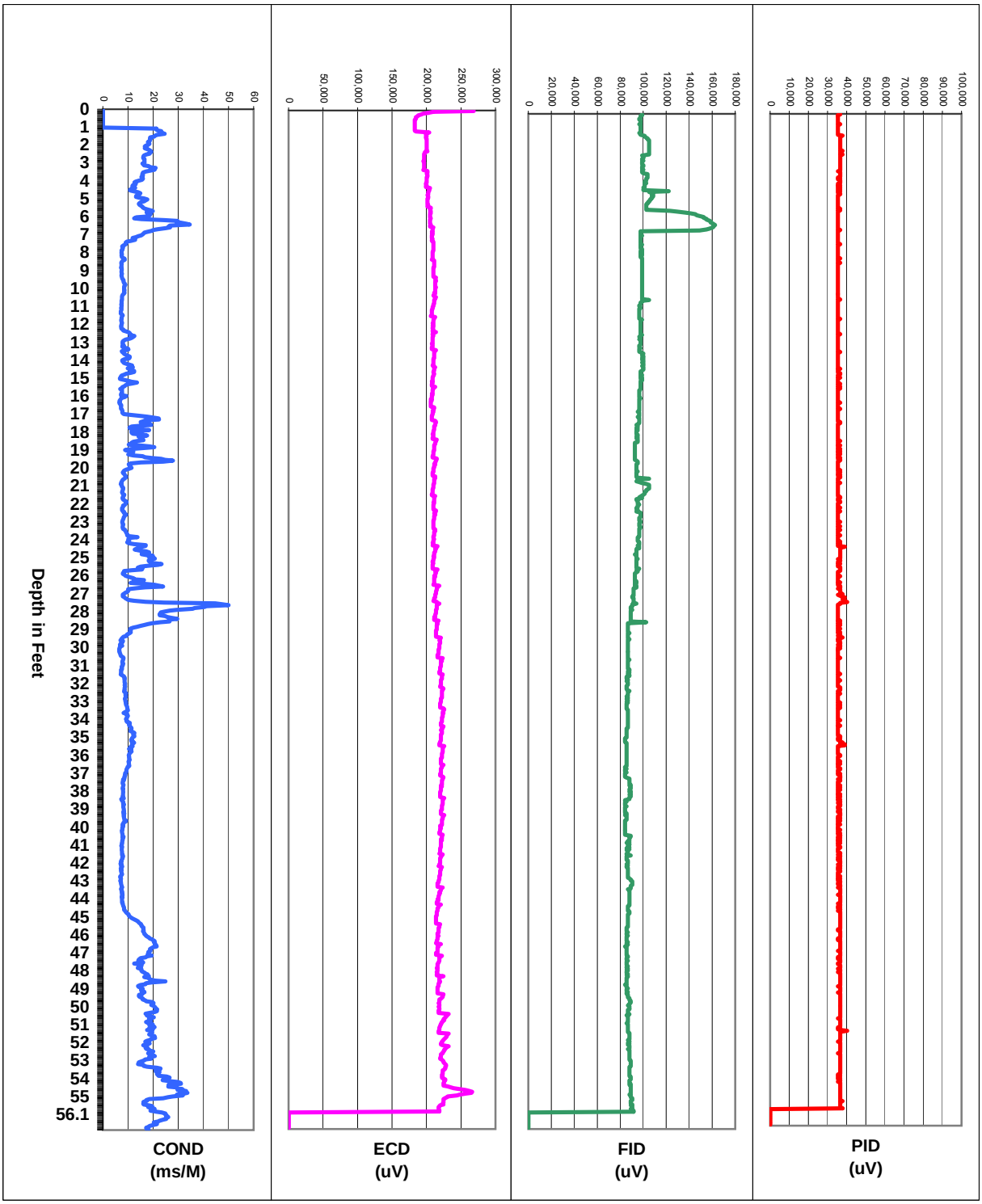
ZEBRA EC/MIP Summary Log, Point CHMIP9
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/13/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 9 of 0

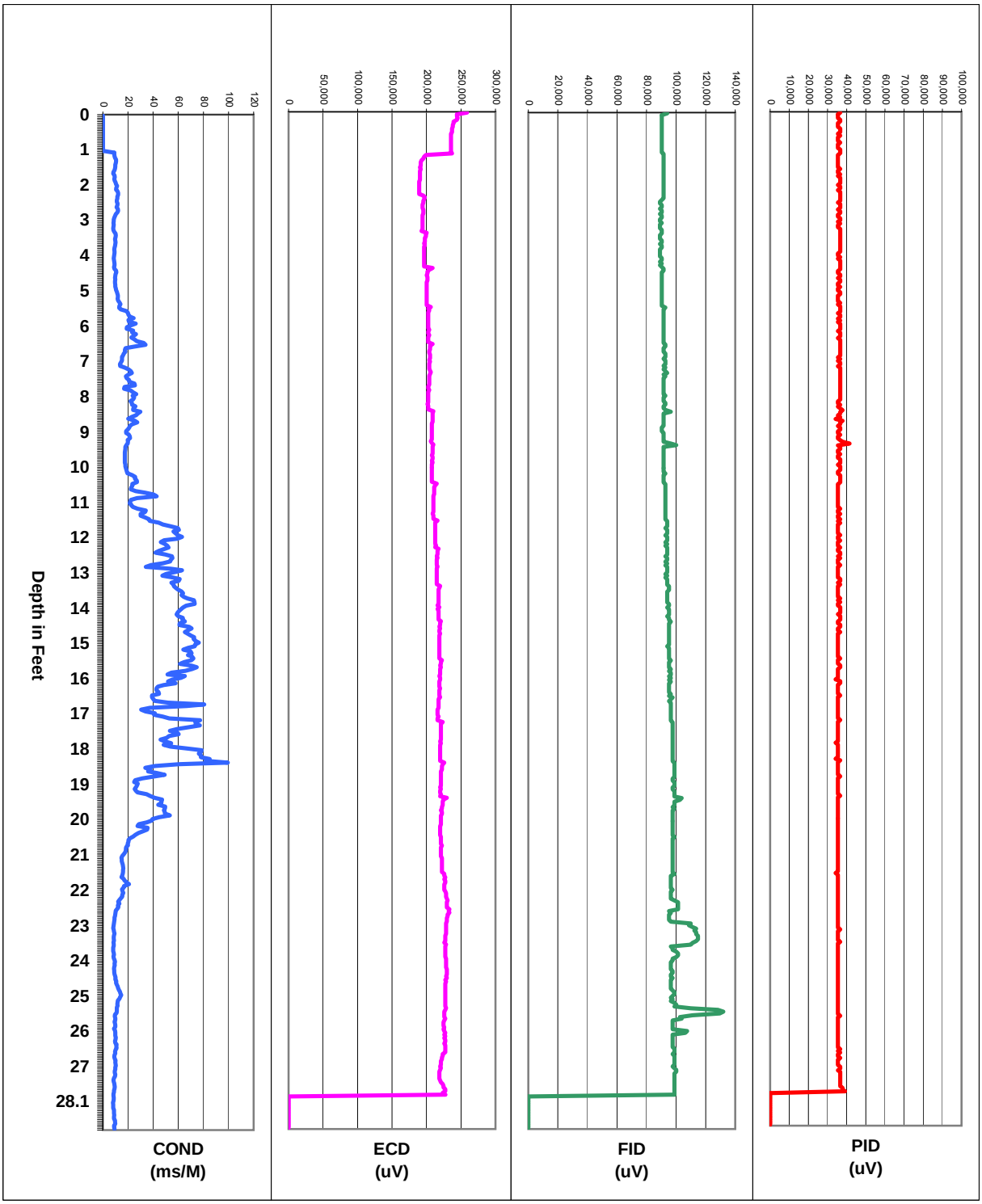
ZEBRA EC/MIP Summary Log, Point CHMIP7
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/13/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 7 of 0

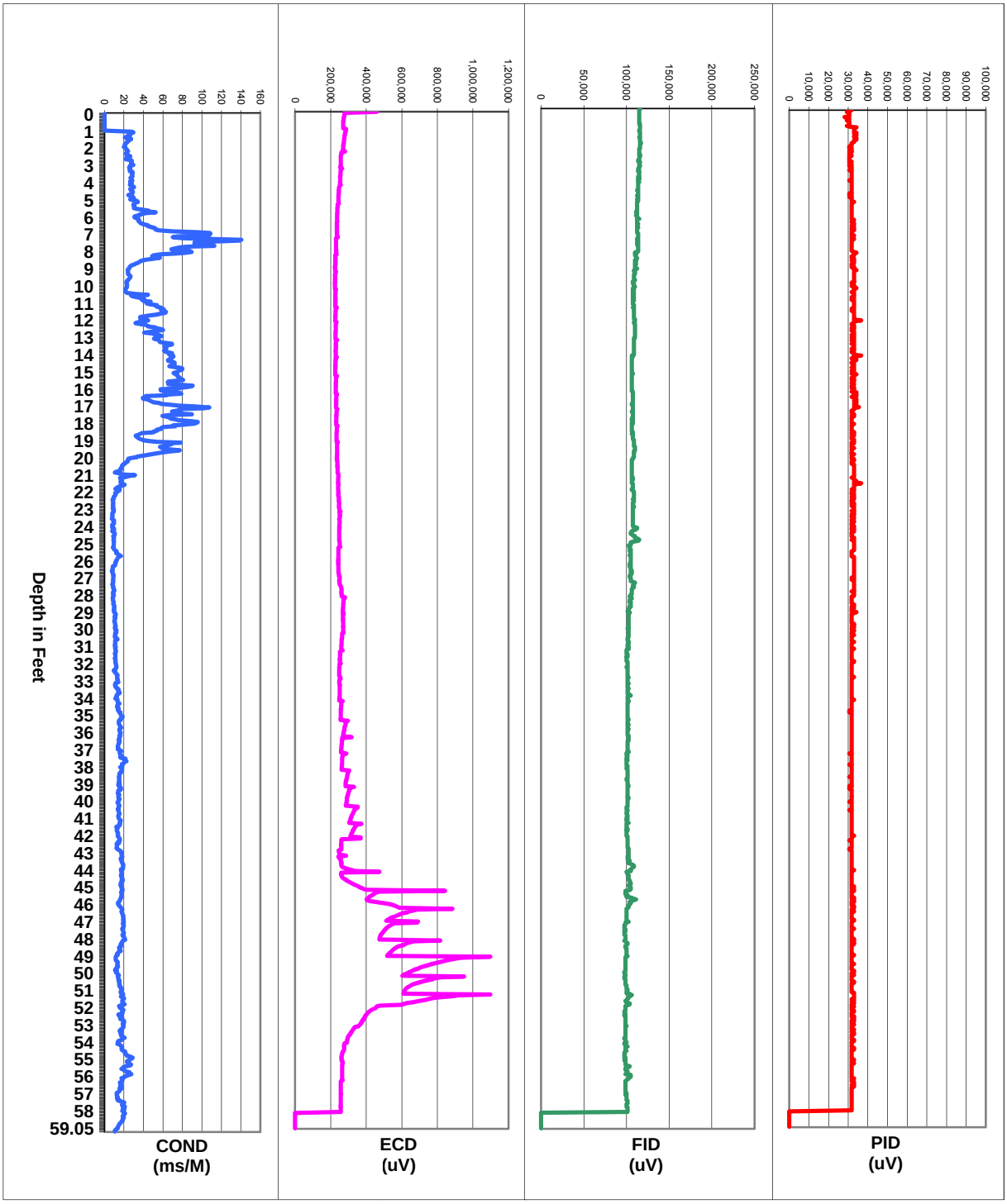
ZEBRA EC/MIP Summary Log, Point CHMIP8
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/13/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 8 of 0

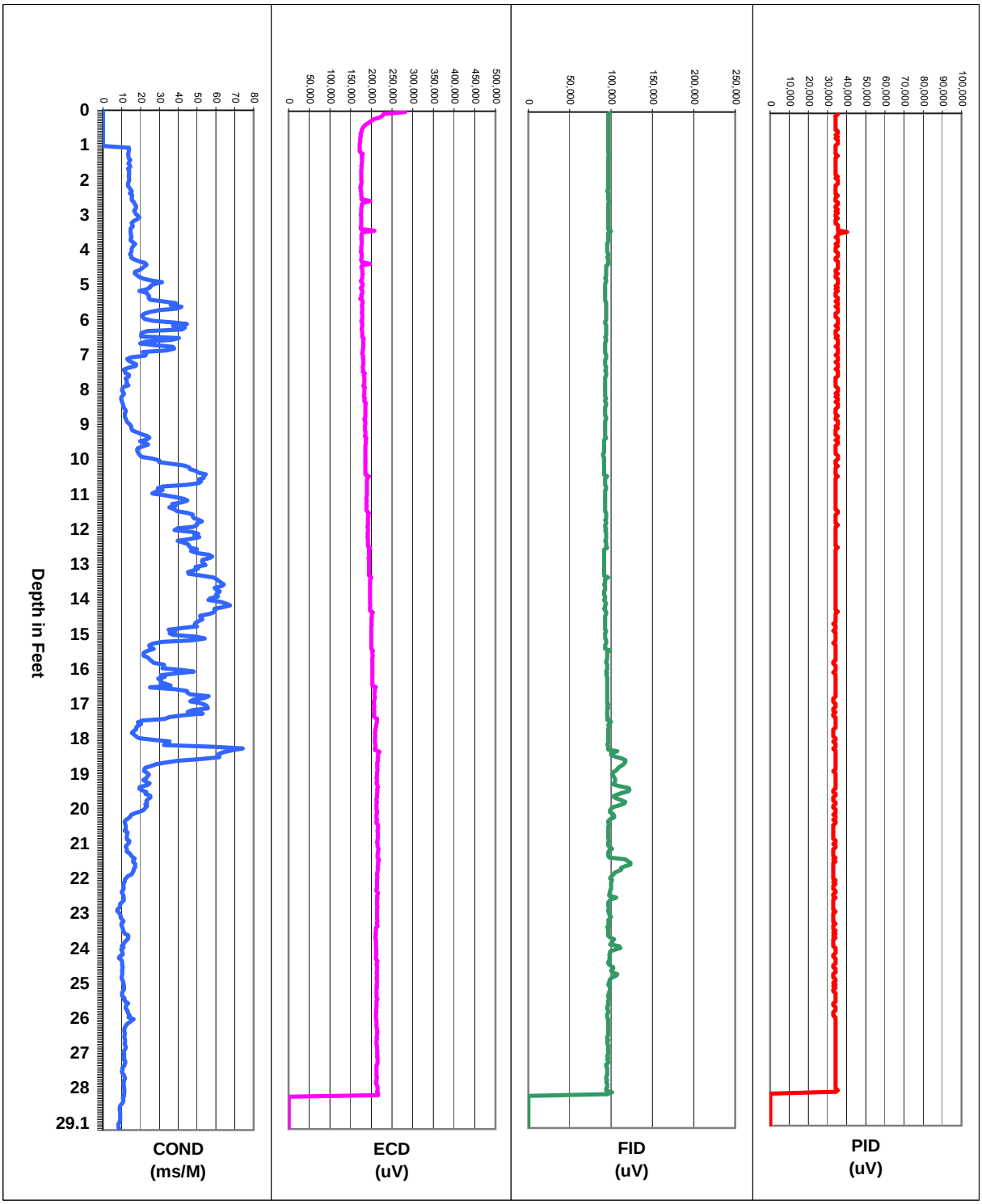
ZEBRA EC/MIP Summary Log, Point CHMIP9
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/14/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 9 of 0

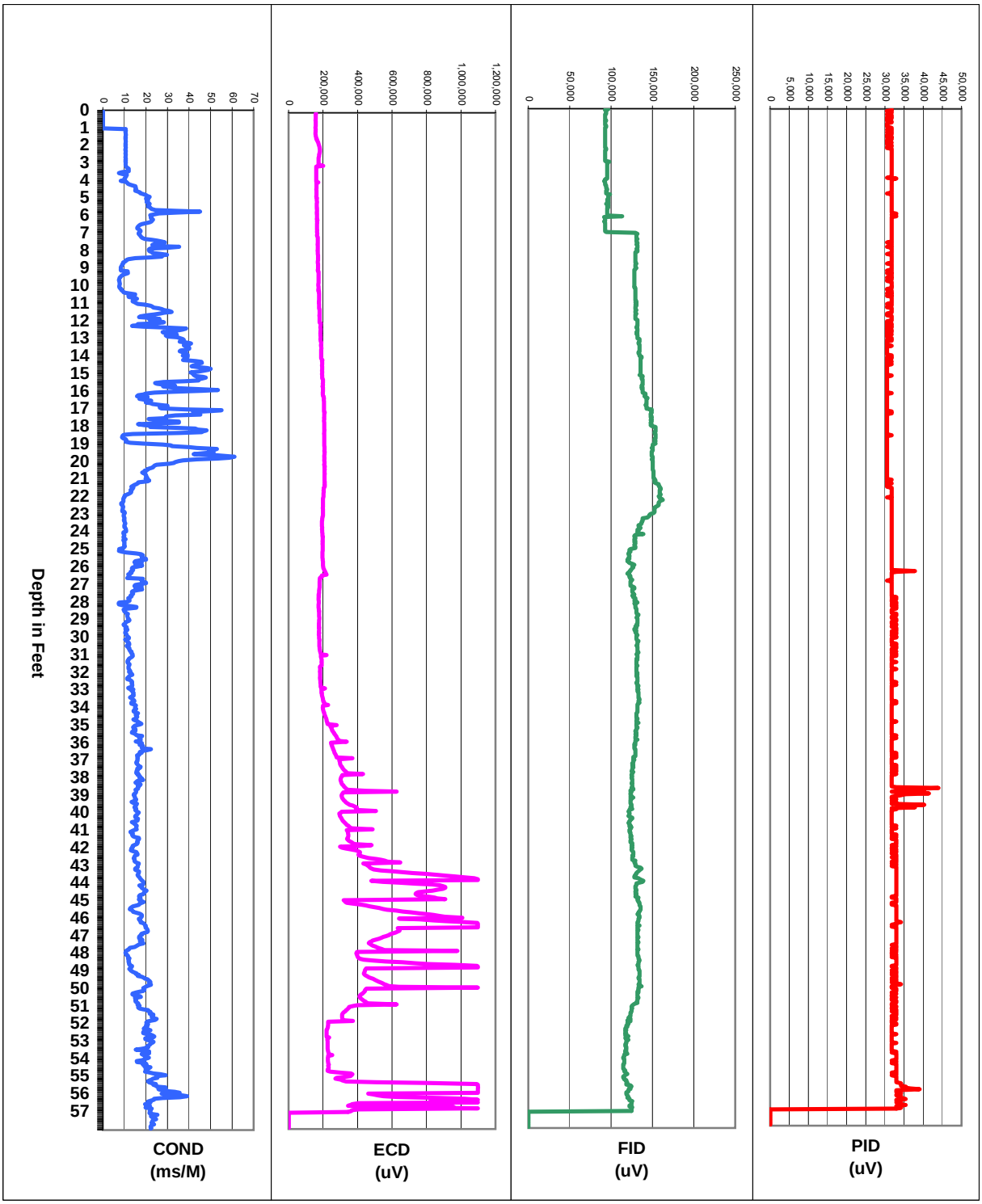
ZEBRA EC/MIP Summary Log, Point CHMIP10
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/14/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 10 of 0

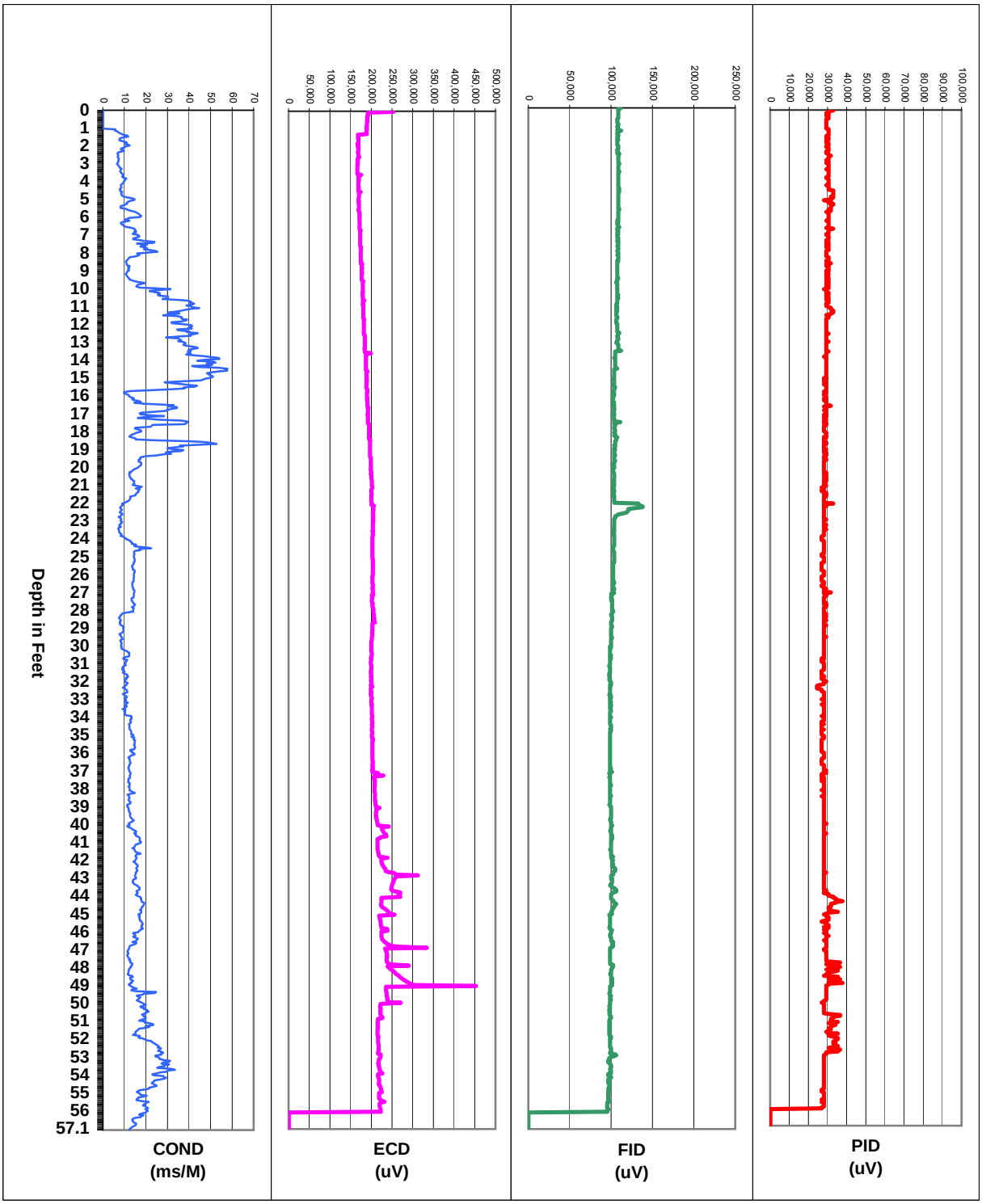
ZEBRA EC/MIP Summary Log, Point CHMIP11
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/14/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 11 of 0

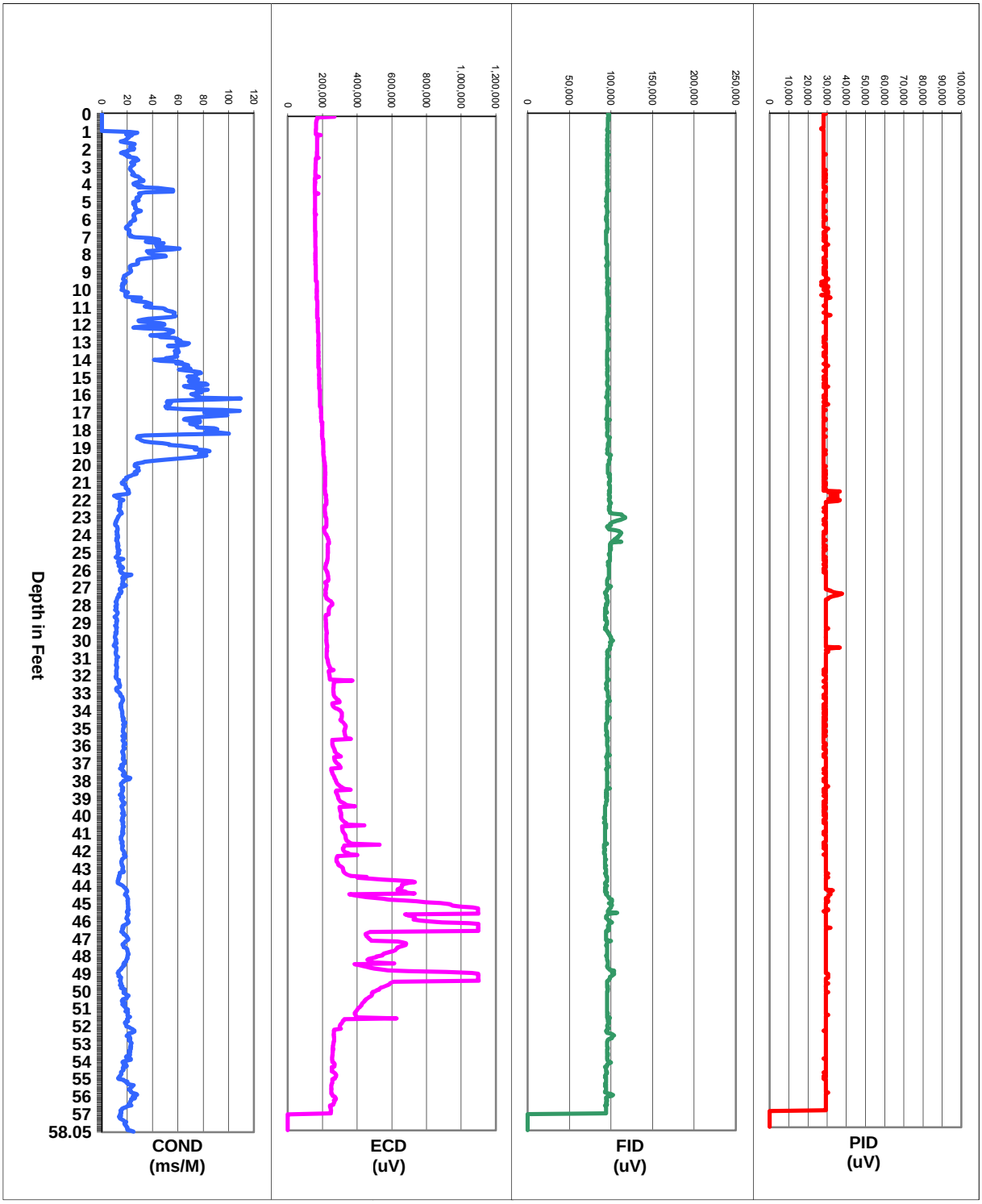
ZEBRA EC/MIP Summary Log, Point CHMIP12
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/15/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 12 of 0

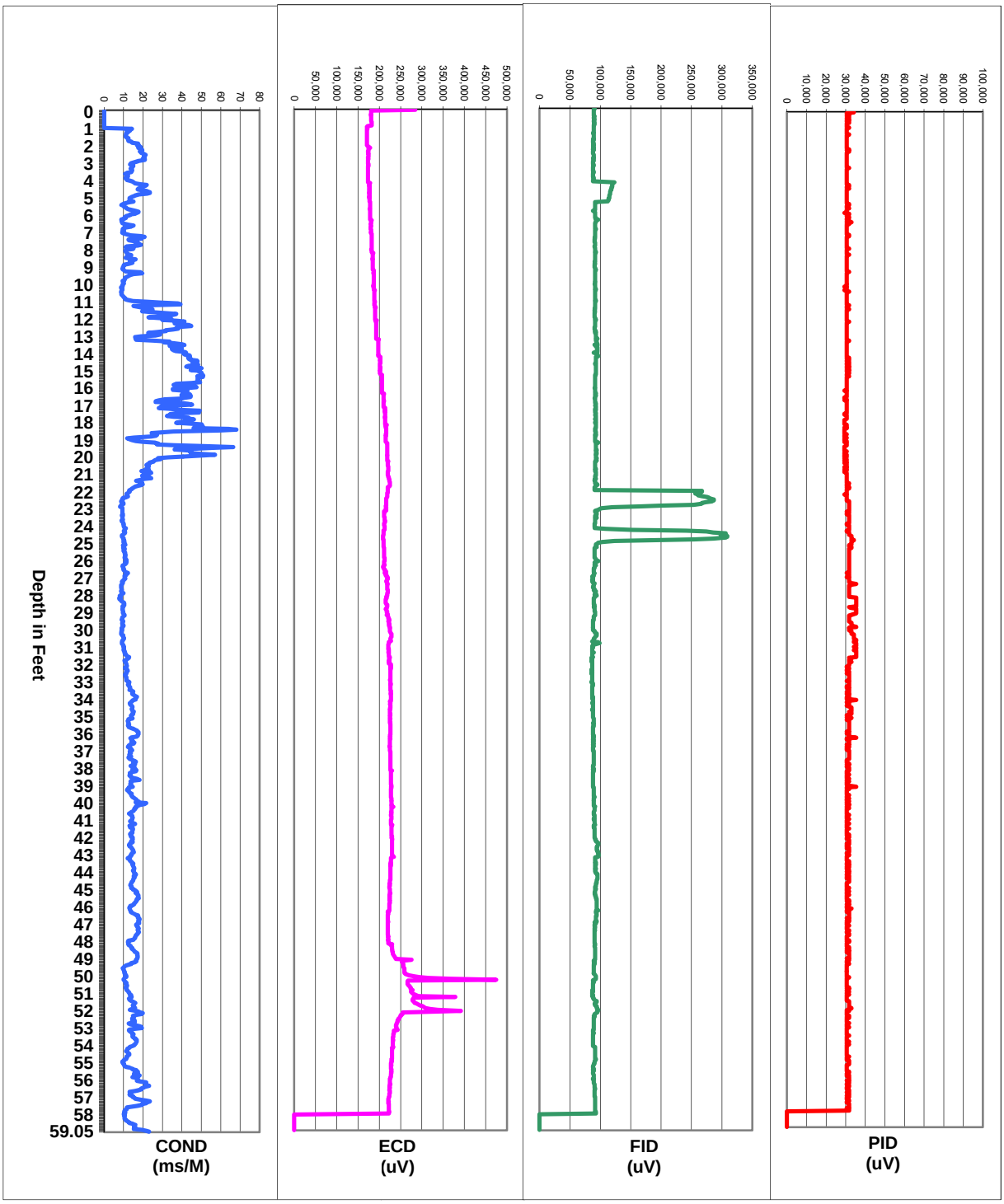
ZEBRA EC/MIP Summary Log, Point CHMIP13



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/15/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 13 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP14
Jacksonville, NC



for: CH2M HILL
by: Zebra Environmental
30 No. Prospect Avenue
Lynbrook, NY 11563
(516) 596-6300

Date: 6/15/2012
Proj. Name: Camp Lejeune
Proj. #: DS20975
Operators: Dan Ferrell
Point 14 of 0

Attachment C
Raw Analytical Data

Attachment C
Raw Passive Soil Gas Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-SG-100	IR78-SG-101	IR78-SG-102	IR78-SG-103	IR78-SG-104	IR78-SG-105	IR78-SG-106	IR78-SG-107		IR78-SG-108	IR78-SG-109	IR78-SG-110	IR78-SG-111	IR78-SG-112	IR78-SG-113		IR78-SG-114	IR78-SG-115
Sample ID:	IR78-SG-100-12A	IR78-SG-101-12A	IR78-SG-102-12A	IR78-SG-103-12A	IR78-SG-104-12A	IR78-SG-105-12A	IR78-SG-106-12A	IR78-SG-107-12A	IR78-SG-107 DUP-12A	IR78-SG-108-12A	IR78-SG-109-12A	IR78-SG-110-12A	IR78-SG-111-12A	IR78-SG-112-12A	IR78-SG-113-12A	IR78-SG-113 DUP-12A	IR78-SG-114-12A	IR78-SG-115-12A
Units:	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng
COMPOUNDS																		
Vinyl Chloride	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichlorofluoromethane (Freon 11)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1-Dichloroethene <25		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methylene Chloride	33.46	26.62	<25	87.94	<25	88.5	<25	<25	<25	<25	<25	53.22	85.44	<25	129.26	164.17	231.46	64.27
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane <25		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene <25		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chloroform	<25	<25	115.73	<25	<25	1334.16	<25	<25	<25	<25	<25	<25	<25	<25	2011.46	2141.84	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Benzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,4-Dioxane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane <25		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Toluene	364.57	<25	<25	<25	109.25	<25	340.65	<25	<25	<25	<25	<25	35.82	56	47	36	<25	<25
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Tetrachloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1,2-Tetrachloroethane <25		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Ethylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
p & m-Xylene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
o-Xylene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3,5-Trimethylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trimethylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dibromo-3-chloropropane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Naphthalene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25

Attachment C
Raw Passive Soil Gas Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-SG-116	IR78-SG-117	IR78-SG-118	IR78-SG-119	IR78-SG-120	IR78-SG-121	IR78-SG-122	IR78-SG-123	IR78-SG-124	IR78-SG-125	IR78-SG-126		IR78-SG-127	IR78-SG-128	IR78-SG-129	IR78-SG-130
Sample ID:	IR78-SG-116-12A	IR78-SG-117-12A	IR78-SG-118-12A	IR78-SG-119-12A	IR78-SG-120-12A	IR78-SG-121-12A	IR78-SG-122-12A	IR78-SG-123-12A	IR78-SG-124-12A	IR78-SG-125-12A	IR78-SG-126-12A	IR78-SG-126 DUP-12A	IR78-SG-127-12A	IR78-SG-128-12A	IR78-SG-129-12A	IR78-SG-130-12A
Units:	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng
COMPOUNDS																
Vinyl Chloride	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichlorofluoromethane (Freon 11)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methylene Chloride	<25	105.04	<25	144.92	38.02	41.96	<25	48.3	<25	<25	25	27	<25	<25	<25	153.55
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	76.06	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	49.08	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chloroform	<25	<25	52.43	1393.18	72.66	<25	<25	100	<25	<25	<25	<25	<25	<25	30	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Benzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	2087.14	<25	<25	<25	<25	<25	<25	<25	25.69	<25	<25	<25	<25	<25	<25	<25
1,4-Dioxane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Toluene	125	<25	40	<25	37	<25	45	<25	<25	<25	36.75	55.17	<25	<25	<25	50.28
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Tetrachloroethene	2211.81	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Ethylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
p & m-Xylene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
o-Xylene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3,5-Trimethylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trimethylbenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dibromo-3-chloropropane	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Naphthalene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25

Attachment C
Raw Groundwater Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-GW01	IR78-GW02	IR78-GW03	IR78-GW04-1	IR78-GW04-2	IR78-GW05	IR78-GW08	IR78-GW09-1		IR78-GW09-3		IR78-GW10	IR78-GW100MCH	IR78-GW101MCH	IR78-GW102MCH
Sample ID	IR78-GW01-11C	IR78-GW02-11C	IR78-GW03-11C	IR78-GW04-1-11C	IR78-GW04-2-11C	IR78-GW05-11C	IR78-GW08-11C	IR78-GW09-1-11C	IR78-GW09-1-12B	IR78-GW09-3-11C	IR78-GW09-3D-11C	IR78-GW10-11C	IR78-GW100MCH-11C	IR78-GW101MCH-11C	IR78-GW102MCH-11C
Sample Date	09/15/11	09/15/11	09/14/11	09/14/11	09/14/11	09/15/11	09/16/11	09/12/11	05/22/12	09/12/11	09/12/11	09/15/11	09/16/11	09/16/11	09/16/11
Chemical Name															
Volatile Organic Compounds (µg/L)															
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	5.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.93 J	2 U	2 U	2 U	2 U	1.2 J	2 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	32	1 U	1 U
cis-1,2-Dichloroethene	5.1	1 U	1 U	1 U	1 U	1 U	1 U	0.75 J	0.93 J	1 U	1 U	1 U	1 U	1.2	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	6.5	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.6	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	16	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	9	1 U	1 U	1 U	1 U	1 U	1 U	40	44	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	95	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	12	3 U	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise

U - Not detected

UD - Analyte not detected at a secondary dilution factor

µg/L - micrograms per liter

Attachment C
Raw Groundwater Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-GW103MCH	IR78-GW104LCH	IR78-GW105MCH	IR78-GW106MCH	IR78-GW107	IR78-GW108UCH		IR78-GW109UCH	IR78-GW11	IR78-GW110MCH	IR78-GW111MCH	IR78-GW112MCH
Sample ID	IR78-GW103MCH-11C	IR78-GW104LCH-11C	IR78-GW105MCH-11C	IR78-GW106MCH-11C	IR78-GW107-11C	IR78-GW108UCH-11C	IR78-GW108UCHD-11C	IR78-GW109UCH-11C	IR78-GW11-11C	IR78-GW110MCH-11C	IR78-GW111MCH-11C	IR78-GW112MCH-11C
Sample Date	09/16/11	09/16/11	09/16/11	09/16/11	09/15/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11	09/14/11
Chemical Name												
Volatile Organic Compounds (µg/L)												
1,1-Dichloroethane	1 U	1 U	1 U	1 U	2.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	7	1 U	1 U	23 J	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	15	2 U	68	2 U	2 U	360	2 U	2 U	2 U	5
Benzene	1 U	1 U	1 U	1 U	0.59 J	1 U	1 U	0.64 J	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	0.51 J	1 U	14	1 U	67	1 U	1 U	360	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4 J	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	28	1 U	26	1 U	1 U	12,000	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	3.4	1 U	1 U	2.5 J	1 U	1 U	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise

U - Not detected

UD - Analyte not detected at a secondary dilution factor

µg/L - micrograms per liter

Attachment C
Raw Groundwater Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-GW113		IR78-GW114	IR78-GW115	IR78-GW117UCH	IR78-GW12	IR78-GW121UCH	IR78-GW122UCH		IR78-GW123UCH	IR78-GW124UCH	IR78-GW125MCH	IR78-GW126MCH	IR78-GW127MCH
Sample ID	IR78-GW113-12B	IR78-GW113D-12B	IR78-GW114-12B	IR78-GW115-12B	IR78-GW117UCH-12B	IR78-GW12-11C	IR78-GW121UCH-12A	IR78-GW122UCH-12B	IR78-GW122UCHD-12B	IR78-GW123UCH-12B	IR78-GW124UCH-12B	IR78-GW125MCH-12B	IR78-GW126MCH-12B	IR78-GW127MCH-12B
Sample Date	05/22/12	05/22/12	05/23/12	05/24/12	05/24/12	09/14/11	04/05/12	05/22/12	05/22/12	05/22/12	05/22/12	05/24/12	05/24/12	05/24/12
Chemical Name														
Volatile Organic Compounds (µg/L)														
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	3.8	3.5	3.5	3	3	2.1	1.5 J
1,2-Dibromo-3-chloropropane	5 U	5 U	5 U	5 U	5 U	1 U	150 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	0.64 J	1 U	1 U
1,2-Dichloroethene (total)	20	19	5	1 U	9.5	2 U	430	170	170	160	140	980 D	380 D	330 D
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1.5 J	0.88 J	0.9 J
cis-1,2-Dichloroethene	20	19	2.2	1 U	9	1 U	430	170	170	160	140	790 D	320 D	250 D
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	80 U	2 U	2 U	2 U	2 U	2 J	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	69 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	3	0.65 J	1 U
Tetrachloroethene	1 U	1 U	14	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	190 D	89	68
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	46 U	1 U	1 U	1 U	1.3 J	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	2.8	1 U	1 U	1 U	40 U	1.2 J	1.2 J	0.76 J	0.82 J	190 D	73	81
Trichloroethene	1.7 J	1.5 J	9.5	1 U	23	1 U	11,000	5,400 D	4,900 D	5,100 D	4,300 D	1,900 D	1,100 D	1,100 D
Vinyl chloride	1 U	1 U	1 U	1 U	1.7 J	1 U	40 U	1 U	1 U	1 U	1 U	27	14	10
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	40 U	3 U	3 U	3 U	3 U	5	3 U	3 U

Notes:

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µg/L - micrograms per liter

Attachment C
Raw Groundwater Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-GW128MCH	IR78-GW129LCH	IR78-GW13	IR78-GW14	IR78-GW16	IR78-GW17-1	IR78-GW17-2	IR78-GW17-4	IR78-GW20		IR78-GW21	IR78-GW22	IR78-GW22-1		IR78-GW23	IR78-GW24-1
Sample ID	IR78-GW128MCH-12B	IR78-GW129LCH-12D	IR78-GW13-11C	IR78-GW14-11C	IR78-GW16-11C	IR78-GW17-1-11C	IR78-GW17-2-11C	IR78-GW17-4-11C	IR78-GW20-11C	IR78-GW20D-11C	IR78-GW21-11C	IR78-GW22-11C	IR78-GW22-1-11C	IR78-GW22-1D-11C	IR78-GW23-11C	IR78-GW24-1-11C
Sample Date	05/22/12	11/15/12	09/17/11	09/16/11	09/16/11	09/16/11	09/16/11	09/17/11	09/16/11	09/16/11	09/17/11	09/16/11	09/18/11	09/18/11	09/15/11	09/13/11
Chemical Name																
Volatile Organic Compounds (µg/L)																
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	3.4	1 U	1 U	1 U	1 U	1 U	81	76	1 U	1 U
1,2-Dichloroethene (total)	1 U	1 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	20	110
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	53	49	2.1	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	19	110
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1	1.2	1.1	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.81 J	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	9	9.6	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6.5	7.4	3.9	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	2.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	17	17	0.83 J	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4	3.8
Trichloroethene	11	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.3
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6	2.5
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	16	17	4.4	3 U

Notes:

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µg/L - micrograms per liter

Attachment C
Raw Groundwater Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-GW24-2	IR78-GW24-3	IR78-GW25		IR78-GW26	IR78-GW29		IR78-GW30-2	IR78-GW30-3	IR78-GW31-2	IR78-GW31-3	IR78-GW32-2	IR78-GW32-3		IR78-GW34	IR78-GW35
Sample ID	IR78-GW24-2-11C	IR78-GW24-3-11C	IR78-GW25-11C	IR78-GW25D-11C	IR78-GW26-11C	IR78-GW29-11C	IR78-GW29D-11C	IR78-GW30-2-11C	IR78-GW30-3-11C	IR78-GW31-2-11C	IR78-GW31-3-11C	IR78-GW32-2-11C	IR78-GW32-3-11C	IR78-GW32-3D-11C	IR78-GW34-11C	IR78-GW35-11C
Sample Date	09/13/11	09/13/11	09/15/11	09/15/11	09/16/11	09/14/11	09/14/11	09/16/11	09/16/11	09/15/11	09/15/11	09/27/11	09/27/11	09/27/11	09/16/11	09/16/11
Chemical Name																
Volatile Organic Compounds (µg/L)																
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	8.6	1.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	8.4	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1.2	1 U	1 U	1 U	1 U	1 U	1 U	12	1.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	12	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Shading indicates detections

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J - Analyte present, value may or may not be accurate or precise

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µg/L - micrograms per liter

Attachment C
Raw Groundwater Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-GW36		IR78-GW37	IR78-GW39	IR78-GW40	IR78-GW42	IR78-GW43	IR78-GW44	IR78-GW45R	IR78-GW46	IR78-GW47	IR78-GW48	IR78-GW50	IR78-GW51R	IR78-GW52R	IR78-GW53R	IR78-GW54R
Sample ID	IR78-GW36-11C	IR78-GW36D-11C	IR78-GW37-11C	IR78-GW39-11C	IR78-GW40-11C	IR78-GW42-11C	IR78-GW43-11C	IR78-GW44-11C	IR78-GW45R-11C	IR78-GW46-11C	IR78-GW47-11C	IR78-GW48-11C	IR78-GW50-11C	IR78-GW51R-11C	IR78-GW52R-11C	IR78-GW53R-11C	IR78-GW54R-11C
Sample Date	09/14/11	09/14/11	09/14/11	09/17/11	09/15/11	09/15/11	09/15/11	09/16/11	09/15/11	09/15/11	09/15/11	09/16/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11
Chemical Name																	
Volatile Organic Compounds (µg/L)																	
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	120	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	2 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	14	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.94 J	2 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	2 U	2 U	500	120	250	2 U	1.5 J	1.6 J	2 U	2 U	2 U	81	4 U	2.4
Benzene	1 U	1 U	1 U	1 U	1 U	2.6	1.4	1 U	1 U	8	2.7	1 U	1 U	1 U	9.1	220	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	500	120	250	1 U	1.5	1.6	1 U	1 U	1 U	81	2 U	2.4
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	60	52	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.7	2 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	7.3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	24	37	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	10 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	0.95 J	3.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	9.7	17	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	2.5	5.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6.7	110	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	2.1	3.9	3.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	8.1	0.97 J	1.8	1 U	1 U	12	1 U	1 U	1 U	1 U	2 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	140	56	110	1 U	1 U	1 U	1 U	1 U	1 U	180	2 U	1.2
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	11	3 U	3 U	3 U	3 U	3 U	3 U	3 U	34	54	3 U

Notes:

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µg/L - micrograms per liter

Attachment C
Raw Groundwater Analytical Data
Site 78 Technical Memorandum

Station ID	IR78-GW56	IR78-GW57	IR78-GW59	IR78-GW60		IR78-GW63	IR78-GW64	IR78-GW65	IR78-GW66	IR78-GW68	IR78-GW71	IR78-GW72	IR78-GW73	IR78-GW74	IR78-GW75-1		
Sample ID	IR78-GW56-11C	IR78-GW57-11C	IR78-GW59-11C	IR78-GW60-11C	IR78-GW60-12B	IR78-GW63-11C	IR78-GW64-11C	IR78-GW65-11C	IR78-GW66-11C	IR78-GW68-11C	IR78-GW71-11C	IR78-GW72-11C	IR78-GW73-11C	IR78-GW74-11C	IR78-GW75-1-11C	IR78-GW75-1D-11C	IR78-GW75-1-12B
Sample Date	09/14/11	09/15/11	09/14/11	09/15/11	05/23/12	09/14/11	09/14/11	09/14/11	09/14/11	09/14/11	09/13/11	09/12/11	09/12/11	09/12/11	09/13/11	09/13/11	05/23/12
Chemical Name																	
Volatile Organic Compounds (µg/L)																	
1,1-Dichloroethane	1 U	1 U	1 U	1 U	3.1	1 U	1 U	1	3.2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.1	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	3.1	1.8 J	26	17	9.6	18	1.6 J	2 U	430	180	2 U	170	130	110	62
Benzene	1 U	1 U	1 U	1 U	25 UD	1 U	1 U	1 U	1 U	1 U	1.1	1.3	1 U	100	1,000	1,100	130
cis-1,2-Dichloroethene	0.77 J	0.57 J	3.1	1.8 J	25 JD	16	9.6	17	1.6	1.1	420	180	1 U	160	130	110	61
Ethylbenzene	1 U	1 U	1 U	1,900	670 D	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1,200	990	1,100	990 D
Isopropylbenzene	1 U	1 U	1 U	160 J	26 JD	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.9	79	80	91	37
m- and p-Xylene	2 U	2 U	2 U	6,000	1,700 D	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	3,600	3,500	3,800	3,000 D
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	2,100	930 D	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1,400	1,500	1,700	1,400 D
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	2.9	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	210	56 D	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2,200	15,000	15,000	8,400 D
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	8.4	5.3	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1.2	1 U	1 U	420	170	2	1.4	0.9 J	1 U	1 U	15	1.9	1 U	1 U	1 U	1 U	1.9 J
Vinyl chloride	1 U	0.78 J	1.4	1 U	1 U	1 U	1 U	2.1	41	1 U	250	110	1 U	1 U	1.3	1.2	1.1 J
Xylene, total	3 U	3 U	3 U	8,200	2,700 D	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	5,000	5,100	5,400	4,400 D

Notes:

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µg/L - micrograms per liter

Attachment C
Raw Groundwater Analytical Data
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Station ID	IR78-GW75-2	IR78-GW76		IR78-GW77	IR78-GW79IW	IR78-GW80DW	IR78-GW80IW		IR78-GW81DW	IR78-GW81IW	IR78-GW82IW	IR78-GW83IW	IR78-GW84IW
Sample ID	IR78-GW75-2-11C	IR78-GW76-11C	IR78-GW76-12B	IR78-GW77-11C	IR78-GW79IW-11C	IR78-GW80DW-11C	IR78-GW80IW-11C	IR78-GW80IWD-11C	IR78-GW81DW-11C	IR78-GW81IW-11C	IR78-GW82IW-11C	IR78-GW83IW-11C	IR78-GW84IW-11C
Sample Date	09/13/11	09/12/11	05/23/12	09/12/11	09/17/11	09/17/11	09/17/11	09/17/11	09/16/11	09/16/11	09/17/11	09/16/11	09/13/11
Chemical Name													
Volatile Organic Compounds (µg/L)													
1,1-Dichloroethane	10 U	1 U	1 U	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	10 U	1 U	1 U	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	10 U	1 U	5 U	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	10 U	1 U	1 U	20 U	1 U	7.8	13	13	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	160	350	430 D	40 U	2 U	1.4 J	1.3 J	1.3 J	2 U	2 U	2 U	2 U	57
Benzene	120	1 U	1 U	20 U	6.4	59	180	180	1 U	1 U	4.3	1 U	0.77 J
cis-1,2-Dichloroethene	160	400	430 D	20 U	0.67 J	1.4	1.3	1.3	1 U	1 U	1 U	1 U	56
Ethylbenzene	97	200	140	1,500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	10 U	76	69	50	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	100	1,600	1,300 D	4,200	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	50 U	5 U	5 U	100 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	38	480	470 D	1,300	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	10 U	1.1	1 J	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	570	11	6.9	2,300	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	10 U	3	2.6	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	11	420	330 D	200	1 U	1 U	2.1	2	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	10 U	0.93 J	1.2 J	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10
Xylene, total	140	2,100	1,800 D	5,500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise

U - Not detected

UD - Analyte not detected at a secondary dilution factor

µg/L - micrograms per liter

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Station ID	IR78-GW85	IR78-GW85IW	IR78-GW86DW	IR78-GW87MCH	IR78-GW88UCH		IR78-GW89MCH	IR78-GW90MCH	IR78-GW91LCH	IR78-GW92MCH	IR78-GW93MCH	IR78-GW94LCH
Sample ID	IR78-GW85-11C	IR78-GW85IW-11C	IR78-GW86DW-11C	IR78-GW87MCH-11C	IR78-GW88UCH-11C	IR78-GW88UCHD-11C	IR78-GW89MCH-11C	IR78-GW90MCH-11C	IR78-GW91LCH-11C	IR78-GW92MCH-11C	IR78-GW93MCH-11C	IR78-GW94LCH-11C
Sample Date	09/15/11	09/15/11	09/17/11	09/16/11	09/15/11	09/15/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11
Chemical Name												
Volatile Organic Compounds (µg/L)												
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1.6	1.7	1 U	15 J	1 U	1.1	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	0.5 J	1 U	1 U	1 U	1 U	1 U	7.7 J	1 U	6.9	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	1.4 J	46	42	300	8,900	2 U	61	86	2 U
Benzene	1 U	1.4	1 U	1	5.3	4.8	1 U	5.3 J	1 U	130	1 U	0.85 J
cis-1,2-Dichloroethene	1 U	0.95 J	1 U	1.4	39	35	200	6,700	1 U	50	86	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.1	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	9.6	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	6.3	140 J	1 U	0.76 J	1 U	1 U
Toluene	1 U	1 U	0.68 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	7.5	6.9	100	2,200	1 U	11	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	150	9,500	1 U	35	1 U	0.64 J
Vinyl chloride	1 U	1 U	1 U	23	39	37	0.92 J	110 J	1 U	15	0.78 J	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise
U - Not detected
UD - Analyte not detected at a secondary dilution factor
µg/L - micrograms per liter

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Station ID	IR78-GW95MCH	IR78-GW96MCH	IR78-GW97LCH	IR78-GW98MCH		IR78-GW99MCH	IR78-GWXXMCH	IR78-MWVI01		IR78-MW116MCH		IR78-RW03	IR78-RW04	IR78-RW05
Sample ID	IR78-GW95MCH-11C	IR78-GW96MCH-11C	IR78-GW97LCH-11C	IR78-GW98MCH-11C	IR78-GW98MCHD-11C	IR78-GW99MCH-11C	IR78-GWXXMCH-12B	IR78-MWVI01-11C	IR78-MWVI01-D-11C	IR78-GW116MCH-12A	IR78-GW116MCHD-12A	IR78-RW03-11C	IR78-RW04-11C	IR78-RW05-11C
Sample Date	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/15/11	05/24/12	09/13/11	09/13/11	03/30/12	03/30/12	09/16/11	09/16/11	09/14/11
Chemical Name														
Volatile Organic Compounds (µg/L)														
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.9 J	12 J	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	21 U	21 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	2 U	2 U	2 U	1 U	84	89	860	810	2 U	2 U	2 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	2.4	2.2	2.3	5.7 U	5.7 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	0.76 J	0.67 J	1 U	1 U	82	87	710	670	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	11 U	11 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	34 U	30 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
Tetrachloroethene	1 U	0.99 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	47	44	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	2.3	1 U	1 U	13 J	8.7 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.9	2.3	150	140	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.9	3	2,700	2,500	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	7.6	25	25	25 J	21 J	1 U	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	5.7 U	5.7 U	3 U	3 U	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a seconda
J - Analyte present, value may or may not be accura
JD - Analyte present at a secondary dilution factor, v
U - Not detected
UD - Analyte not detected at a secondary dilution fa
µg/L - micrograms per liter

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Station ID	IR78-RW07		IR78-RW09R	IR78-RW10	IR78-RW11	IR78-RW12	IR78-RW13	IR78-RW14	IR78-RW15
Sample ID	IR78-RW07-11C	IR78-RW07D-11C	IR78-RW09R-11C	IR78-RW10-11C	IR78-RW11-11C	IR78-RW12-11C	IR78-RW13-11C	IR78-RW14-11C	IR78-RW15-11C
Sample Date	09/13/11	09/13/11	09/14/11	09/13/11	09/13/11	09/13/11	09/16/11	09/16/11	09/13/11
Chemical Name									
Volatile Organic Compounds (µg/L)									
1,1-Dichloroethane	1 U	1 U	1 U	1 U	2 U	1 U	4.8	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	2 U	1 U	2.3	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	1.2 J	2 U	2 U	1.3 J	110	65	56	2 U	120
Benzene	1 U	1 U	1 U	4.6	1.2 J	4.7	13	1 U	100
cis-1,2-Dichloroethene	1.2	1	1 U	1.3	100	62	56	0.97 J	120
Ethylbenzene	1 U	1 U	1 U	1 U	2 U	1 U	0.83 J	1 U	180
Isopropylbenzene	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	18
m- and p-Xylene	2 U	2 U	2 U	2 U	4 U	1.5 J	2 U	2 U	640
Methylene chloride	5 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	5 U
o-Xylene	0.65 J	1 U	1 U	1 U	2 U	0.75 J	0.81 J	1 U	200 J
Tetrachloroethene	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1
Toluene	1 U	1 U	1 U	1 U	2 U	1 U	0.92 J	1 U	730 J
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	3.1	2.8	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	0.56 J	1.5 J	20	5.4	1.3	19
Vinyl chloride	1 U	1 U	1 U	1 U	240	7.5	45	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	6 U	2.2 J	3 U	3 U	840

Notes:

Shading indicates detections

D - Compound identified in an analysis at a seconda
J - Analyte present, value may or may not be accura
JD - Analyte present at a secondary dilution factor, v
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µg/L - micrograms per liter